

REVISED EDITION
CATALOG NO. 25 and SUPPLEMENT

Starrett TOOLS

THE L.S. STARRETT COMPANY

Electrotypes

We are glad to furnish electrotypes of the tools we make to any dealer who will use them. We can supply them in the sizes used in this catalog or reduced to 1½ inches the longer way, as in the following examples:



Catalog Size



Small Size

All electrotypes are made from good wood cuts. We send out only new electrotypes, and will furnish either size, as may be preferred by the dealer, without charge.

We are constantly using large space in the best mechanical papers to acquaint mechanics with the merits of our goods. Dealers can turn this publicity to their own account, and focus on their own stores the benefit of the general advertising we do by advertising locally in newspapers, street cars, by circulars, catalogs, etc., that they sell Starrett Tools.

When calling for electrotypes kindly state whether Catalog or Small Size, as explained above, are required.

L. S. STARRETT 1880

THE L. S. STARRETT CO. 1900

REVISED
CATALOG No. 25

COPYRIGHT, 1935
The L. S. Starrett Co.

FINE MECHANICAL TOOLS

TRADE
Registered



MARK
U. S. Pat. Off.

Trade Marks Registered in Foreign Countries

TRADE MARK
STARRETT
REG. U. S. PAT. O.

Manufactured by
The L. S. Starrett Company

World's Greatest Toolmakers

**MANUFACTURERS OF HACKSAWS UNEXCELLED
STEEL TAPES—STANDARD FOR ACCURACY**

**Athol, Massachusetts
UNITED STATES**

CODES

Cable Address, Starrett, Athol

Acme.
Lieber's, New Business.
Bentley's Complete Phrase Code,
Improved.

NEW YORK
90-92 West Broadway

CHICAGO
17 N. Jefferson St.

LONDON
35, 36, 37, Upper Thames St., E.C.

Printed in U. S. A.

The List Prices have been revised in this Catalog on the following numbers shown in our previous Catalog No. 25, to agree with our Revised List Prices dated April 9, 1934.

Tool Number	Catalog Page	Tool Number	Catalog Page
12	77	293	319
13	107	360	93
15	99	362	90
20	102	364	95
33	71	359	96
43	270	433	83
47	100	434	84
57	247	454	124
65	130	472	41
117	287	490-491	78-79
129	291	492	81
161	230	493	98
176	292	426	114
183	97	28	116
193	99	126	195
236	146	89	274
236H	147	20	102
246	228	Steel Tapes	46 to 62
257	249	Hack Saws	350 to 354

Please see that your price records agree with this Revised Catalog.

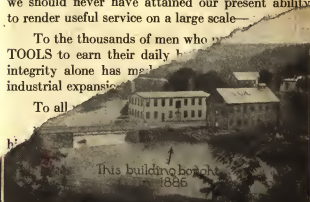
Our Pledge TO INDUSTRY

* * *

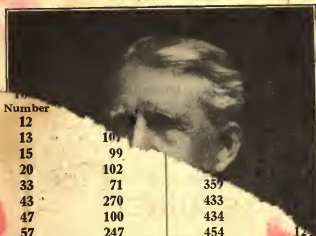
To the trade without whose loyal co-operation we should never have attained our present ability to render useful service on a large scale—

To the thousands of men who use our
TOOLS to earn their daily bread
integrity alone has made possible
industrial expansion

To all



The two sections middle and left erected in 1894.

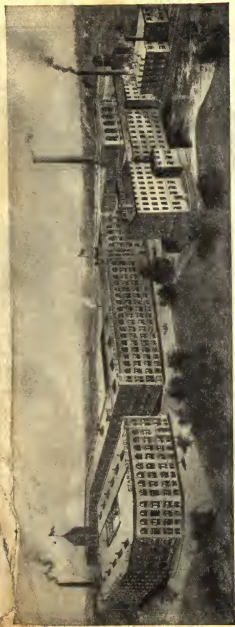


Number

12			
13	107		
15	99		
20	102		
33	71	359	
43	270	433	
47	100	434	
57	247	454	124
65	130	472	41
117	287	490-491	78-79
129	291	492	81
161	230	493	98
176	292	426	114
183	97	28	116
193	99	126	195
236	146	89	274
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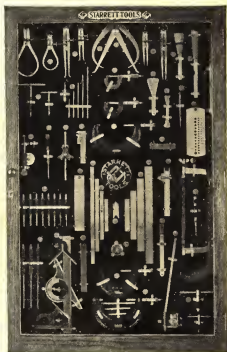


WORKS OF THE L. S. STARRETT CO., AT ATHOL, MASS., U. S. A.

THE LARGEST PLANT IN THE WORLD

DEVOTED EXCLUSIVELY TO THE MANUFACTURE OF FINE MECHANICAL TOOLS, HACK SAW BLADES AND STEEL TAPES

Display Cases for Dealers



To assist our Trade in promoting additional sales for Starrett Tools, we are pleased to furnish Display Cases or Panels on which our tools are mounted.

These cases not only make an attractive Display of Starrett Tools, but also keep the tools in perfect condition, free from unnecessary handling, thus providing a very valuable store fixture for any dealer.

We are equipped to, and will gladly mount our tools on display panels sent in by any of our dealers, charging only for the tools at our regular prices.

Full particulars, with prices, quoted upon application.

Important to Mechanics and Dealers

Please destroy old numbers and order only from this
REVISED CATALOG, No. 25

STARRETT TOOLS are made by skilled mechanics, in modern factories, clean, well lighted, well ventilated; equipped with up-to-date machinery and appliances for the production of the highest grade of tools and instruments of precision. The parts of tools are carefully tested at every stage of their manufacture, and each completed tool is rigidly inspected before shipment. They have long been recognized as the standard for accuracy, workmanship, design and finish. They are preferred by skilled mechanics with whom accuracy is a matter of pride as well as of livelihood.

EVERY TOOL IS WARRANTED accurate and satisfactory. In the immense number of tools we are constantly sending out it is unavoidable, in spite of our safeguards and precautions, that one will occasionally be found which is not of Starrett quality. We shall esteem it a favor if our customers will notify us of any such case, and any tool proving defective in material or workmanship will be gladly replaced. Our tools are not warranted, however, against breaking or against the results of improper usage. *No tool on which a name has been stamped will be replaced or exchanged.*

THE PRICES in this Catalog are net selling prices and are subject to change without notice. Mechanics are requested to buy our tools of regular hardware and mill supply dealers, the better class of which carry them in stock; but in places in the United States or Canada where the hardware dealers do not sell our goods, we will send them, carriage charges prepaid, on receipt of cash to cover the amount ordered. We do not pay the duty on goods going to Canada. Payment may be made by cashier's check, express or postal money order, or by currency enclosed in a registered letter. When goods are ordered to be sent by express C. O. D., 20% of the amount must accompany the order, and the express charge for return of money will be added. Cash with order will save this extra expense.

IN ORDERING do not fail to give the *tool number* and *size* of each article wanted.

TO DEALERS we sell at a discount sufficient to insure a fair profit after deducting cost of carriage, handling, advertising and keeping the goods in stock. Discount sheets will be sent to regular dealers on application. Discounts are subject to change without notice. We do not pay carriage in any case to dealers.

Dealers without adequate commercial ratings must send satisfactory references before goods will be shipped, except for cash with order.

SHIPPING INSTRUCTIONS must be given with each order. Whether the goods are to be sent by freight, express or mail must be distinctly stated. When goods are ordered sent by mail, parcel post, insured will be assumed to be meant. For insurance fees see inside back cover. In the absence of shipping instructions we will ship by what we consider the best way, cheapness, quickness, and safety being considered, and cannot be held responsible for transportation charges, delay, or loss in transit; if by express, no allowance will be made for difference between express and freight charges.

The goods are sold and our responsibility ceases when delivery is made to the transportation company or post office, and we will replace no goods lost in transit. Should miscarriage or loss occur, however, we will do our best, in the interest of the purchaser, to have the lost goods found or proper restitution made by the transportation company at fault.

CLAIMS FOR LOST SHIPMENTS, sent to places in the United States and Canada, must be made within sixty days from date of invoice; in foreign shipments such claims must be made within 120 days from date of invoice.

CLAIMS FOR ERRORS or shortages must be reported immediately on receipt of goods. Actual errors or shortages will be rectified as promptly and cheerfully after a bill has been paid as before.

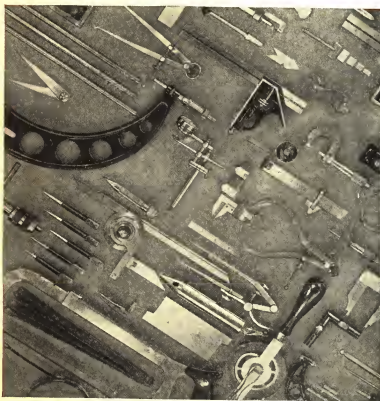
WHEN GOODS ARE RETURNED for repairs or for other reason, *the name of the sender must be plainly marked on the package*, and the transportation charges prepaid. A letter giving full information as to what is wanted should be mailed at the time goods are sent. Tools to be repaired should be sent to the factory at Athol, not to any of our branches.

All business communications should be addressed to the Company, not to individuals.

COME TO SEE US. A cordial invitation is given to our dealers to stop at Athol when convenient and get personally acquainted with us and see our works.

Special Work

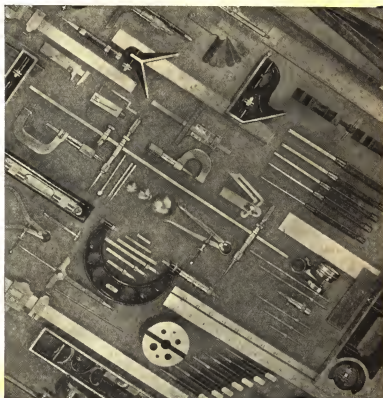
Our many years of manufacturing experience combined with our excellent equipment enable us to manufacture special tools and gages in large or small quantities at the lowest possible cost. In addition to special inquiries for odd sizes and graduations of steel rules, straight edges, etc., we will gladly estimate on any specifications sent us, if they are such as we are in a position to handle.



FOR SURE ACCURACY . . .

When you're working on a fussy job, there's a lot of satisfaction in knowing that you can trust your tools.

For over fifty years skilled workmen in every craft have placed complete confidence in Starretts. Dependable Starrett accuracy has made their work surer—more precise. Among the more than 2500 Starrett Tools described in this catalog, you will find just the tools you need to help you turn out the caliber of work that makes a man valuable on any job.



FOR GOOD WORK . . .

You'd have a hard time finding a more experienced group of craftsmen than the men responsible for the accuracy and convenient design of your Starrett Tools. They know how to build into them all the extra features that make your work easier and quicker.

Look over the tools described in this catalog and pick out the ones you need. You are sure to find at least a few that will pay for themselves a dozen times over in better, faster work.

Set of Tools No. 900 For Students and Apprentices

Students and apprentices in starting out to learn the many different trades where the use of fine mechanical tools is absolutely necessary, will find listed on this and the following page, two sets of our tools, with cases, including tools that the journeyman's experience has proved to be both essential and sufficient to the equipment of a beginner.



In folding case, about 1 3/4 in. x 4 3/4 in. x 7 in.



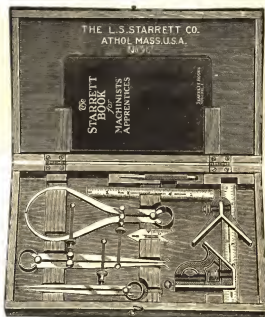
Set complete as shown in cut contains:

- No. 11 6 inch Combination Square complete.
- No. 117-B Center Punch.
- No. 320 6 inch Flexible Steel Rule in pocket case.
- No. 390 Center Gage.
- No. 241 4 inch Caliper.
- No. 79 4 inch Outside Caliper with solid nut.
- No. 73 4 inch Inside Caliper with solid nut.
- No. 83 4 inch Divider with solid nut.

Price.....\$8.75

Set of Tools No. 901

For Students and Apprentices



In substantial and nicely finished wood case about $1\frac{1}{2}$ in. x 7 in. x 12 inches. Set complete as shown in cut contains:

- No. 11 6 inch Combination Square, complete.
- No. 320 6 inch Flexible Steel Rule in pocket case.
- No. 117-B Center Punch.
- No. 390 Center Gage.
- No. 77 5 inch Divider with spring nut.
- No. 79 6 inch Outside Caliper with solid nut.
- No. 73 6 inch Inside Caliper with solid nut.

The Starrett Book for Machinists' Apprentices. Volume I.

Price \$10.00

The Starrett Books

Handy volumes, 7 inches by 4½ inches, printed in clear type, on good paper and strongly bound in serviceable Athol imitation leather.



Volume I

For Machinists' Apprentices

184 pages of material that shows "how to do it." Essential to the beginner, valuable to the experienced machinist. It deals with the layout and precise measurement of work. Also shows use of tools. Helpful to the apprentice and handy for the foreman.

Price \$0.75



Volume II

Data Book for Machinists

180 pages of important technical data, tables that relate to machine speeds, power transmission, drilling, turning and milling, materials, etc. This book is of exceptional value to the practical machinist, foreman, and superintendent.

Price \$0.75



Volume III

For Motor Machinists and Auto Repairmen

206 pages of information which Motor Machinists and Auto Repairmen will appreciate. With many reference tables it covers, in an easily understandable manner, the methods and general practice in automobile and engine repair work. A particularly valuable book for the beginner. Useful to the most experienced. Should be in every garage.

Price \$0.75

Steel Rules



The many advantages of light, thin, spring-tempered steel rules over ordinary thick, soft rules are so apparent that they are at once adopted by mechanics. The popularity of our spring-tempered rules is shown not only by the increasing demand for them among mechanics and draftsmen but also by the fact that other manufacturers have been forced to imitate them and to adopt as near as they are able our improved methods of making them.

Attention is invited to the variety of rules that we make: Spring-tempered, both light and heavy, Flexible, Semi-Flexible, Narrow and Desk; Spring-tempered and Flexible Rules graduated in the Metric System as well as combining both the Metric and the English measures, also our latest achievement—Stainless Steel Rules.

In 1882, the late Mr. L. S. Starrett began the manufacture of spring-tempered steel rules. At once they became the favorite among mechanics and are still the leaders in this class of fine tools. Our many years experience in making tempered rules has naturally led to a continually improved product, and our present methods have been made possible by new graduating machines from Mr. Starrett's own designs. Our new departments, equipped with every perfected appliance needed in the manufacture of accurate scales, are meeting every requirement.

Our rules are made to agree with the accurate standards furnished by the United States Government. From time to time we forward our standards to the Bureau of Standards at Washington where they are compared with the government standards.

In this manner our standards are not only strictly accurate, but are kept so. The most minute error due to wear of the standards we use for comparison is provided for.

Steel Rules

English Measure

Graduations

These Rules are divided into parts of inches as follows:

No. 1 Graduation

1st corner.....	10, 20, 50, 100
2d "	12, 24, 48
3d "	16, 32, 64
4th "	14, 28

No. 2 Graduation

1st corner.....	10, 20, 50, 100
2d "	12, 24, 48
3d "	16, 32, 64
4th "	8

No. 4 Graduation

1st corner.....	64
2d "	32
3d "	16
4th "	8

No. 7 Graduation

1st corner.....	64
2d "	32
3d "	16
4th "	100

No. 10 Graduation

1st corner.....	32
2d "	64

No. 11 Graduation

1st corner.....	64
2d "	100

No. 12 Graduation

1st corner.....	50
2d "	100

No. 16 Graduation

1st corner.....	32
2d "	64
3d "	50
4th "	100

Spring-Tempered Steel Rules



Thickness: $\frac{1}{4}$ in. or No. 18 gage.

Approximate

widths: Inches, $\frac{1}{2}$ $\frac{3}{4}$ 1 $1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4

Lengths: " 1 2 3 4 6 9 12 18 24 36 48

Prices: \$0.30 .45 .60 .75 .90 1.35 1.65 2.60 3.25 7.00 10.00

No. 300 has No. 4 graduation. Made in lengths 1 in. to 48 in. inc.

No. 301 " No. 1 " " " 6 in. and 12 in. lengths only.

The No. 301 Rule is commonly used on gear cutting work.

No. 302 has No. 2 graduation. Made in 6 in. and 12 in. lengths only.

*No. 307 " No. 7 " " " lengths 1 in. to 48 in. inc.

No. 309 " No. 16 " " " 6 in. and 12 in. lengths only.

*No. 307 Rules, 36 in. and 48 in. are made $1\frac{1}{2}$ in. wide and $\frac{1}{10}$ in. thick.

1 inch to 12 inch, inclusive packed 6 in a box.
18 inch and up, inclusive packed 1 in a package.

Spring-Tempered Steel Rules No. 303

With Graduated End



No. 303 has No. 4 graduation and is graduated in 32ds of an inch on opposite sides of one end.

These rules are of the same widths and thicknesses as corresponding lengths of No. 300 rules.

Made in 2 in. to 12 in. lengths only, inclusive.

Prices: The same as for No. 300 rules, listed above.

Packed 6 in a box.

Spring-Tempered Steel Rules

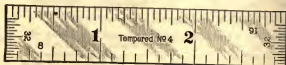
Quick Reading



No. 600 Front

Special attention is called to the fact that these rules are figured so as to assist the user to quickly read the 64ths and 32nds, as shown by the cut.

No. 600 has No. 4 graduation, which consists of 8ths and 16ths on one side, and 32nds and 64ths on the other. Made in 1 inch to 24 inch lengths, inclusive.



No. 603 Reverse

No. 603 has No. 4 graduation, with the 64ths and 32nds figured, like No. 600, and is graduated in 32nds of an inch on both ends of one side, as shown by the cut. Made in 2 inch to 12 inch lengths, inclusive.

No. 600 and No. 603

Approximate thickness: 3/64 in., or No. 18 gage.

Approximate

width: Inches,

Lengths:

Prices:

3 1/2	3 1/2	9/16	3/4	3/4	3/4	1	1 1/4	1 1/2
1	2	3	4	6	9	12	18	24
\$0.30	.45	.60	.75	.90	1.35	1.65	2.60	3.25

No. 607



No. 607 has No. 7 graduation, which consists of 16ths and 32ds on one side, and 64ths and 100ths on the other. Special attention is called to the fact that these rules are figured so as to assist the user to quickly read the 64ths and 100ths as shown by cut. No. 607 made only in 4 inch, 6 inch and 12 inch lengths.

Same widths and thicknesses as No. 600 and No. 603, listed above.

Lengths..... 4 in. 6 in. 12 in.

Prices..... \$0.75 .90 1.65

Rules on this page packed
1 to 12 inch, 6 in a box.
18 inch and 24 inch, 1 in a package.

Spring-Tempered Steel Rules

With One Beveled Edge



No. 400 has No. 4 graduation, with 64ths on the beveled edge.

Approximate thickness: $3/64$ in., or No. 18 gage.

Approximate width: Inches,	$1/2$	$1/2$	$9/16$	$5/8$	$3/4$	$3/4$	1	$1 1/4$	$1 1/4$
Lengths: "	1	2	3	4	6	9	12	18	24
Prices:	\$0.30	.45	.60	.75	.90	1.35	1.65	2.60	3.25

No. 407 has No. 7 graduation, with 100ths on the beveled edge.

Approximate thickness.....	$3/64$ in. or No. 18 gage								
Approximate width.....	$3/4$ "								
Length.....	6 "								
Prices.....	\$0.90								

See pages 40 and 41 for other beveled edge rules.

Heavy Spring-Tempered Steel Rules



No. 410 Heavy, Spring-tempered, No. 4 graduation.

Thickness, about $1/10$ inch.

Widths, about, Inches...	$1 1/4$	$1 1/4$	$1 1/4$	$1 1/4$	$1 1/4$	$1 1/4$	$1 1/4$
Length, Inches.....	12	18	24	36	48	60	72
Prices.....	\$1.65	\$2.60	\$3.25	\$7.00	\$10.00	\$20.00	\$24.00

Semi-Flexible Steel Rules Quick Reading



No. 325 Semi-Flexible, No. 4 graduation, and graduated in 32ds of an inch on both sides of one end. Made in 6 inch and 12 inch lengths only.

These rules are about $1/50$ inch thick, slightly heavier than the Flexible Rules and lighter than the Spring-Tempered Rules. They are of the same widths as the corresponding lengths of Spring-Tempered Rules.

Lengths.....	6 in.	12 in.
Prices.....	\$0.90	\$1.65

Rules on this page packed 1 to 12 inch, 6 in a box, 18 inch and up, 1 in a package.

Flexible Steel Rules



These are very thin, spring-tempered rules, nicely graduated on one side only. Those from 1 inch to 12 inches are $\frac{3}{8}$ inch wide, and will easily conform to a 2-inch circle. Those from 18 inches to 48 inches are $\frac{1}{2}$ inch wide, and are made from a trifle heavier stock.

Lengths: Inches, 1 2 3 4 6 9 12 18 24 36 48
 Prices: \$0.30 .45 .60 .75 .90 1.35 1.65 2.60 3.25 7.00 10.00

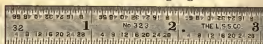
No. 320 No. 10 graduation. (32nds and 64ths.)

No. 321 No. 11 " (64ths and 100ths.) 6 in. and 12 in. only.

No. 322 No. 12 " (50ths and 100ths.) 6 in. and 12 in. only.

Flexible Steel Rule No. 323

with Quick Reading Figures



Has the usual 64ths and 32nds graduations. Every 4th graduation of 32nds and 8th graduation of 64ths numbered. Gives mechanics another choice of flexible rule with quick readings.

Price each, 6 inch.....\$0.90

Flexible Steel Rule No. 324

Graduated Both Sides. Quick Reading.

Patented



A departure from the conventional flexible steel rule as both sides are graduated, as shown by the above cuts. Graduated 64ths on one side and 32nds on the other with the addition of our quick reading figures.

As illustrated, it is graduated on opposite sides and opposite edges and from one end.

Close working mechanics, more and more, lean to the 6 inch flexible rule as the one rule they carry and as this rule is graduated so it is always in the natural position to use, it is becoming very popular. (No turning end for end nor measuring with figures upside down.) Made only in 6 inch length.

Price, 6 inch.....\$0.90

Note: Cases with clips, for flexible rules, will be supplied at a price of 15c each, list.

Flexible Steel Rule with Pocket Klip No. 320 K Patented



Designed specially for shopmen who use a rule many times a day. Mechanics have seen and devised numerous methods for fastening rules to their clothes but here is a combination which we believe superior to all others.

Simple—just a klip permanently attached to a 6 inch flexible rule.

The klip is positioned at the 4-inch mark, garment pocket depths being considered. Rule cannot be released without slight downward pressure on the pawl.

The No. 320 K comprises our No. 320—6 inch Rule with Klip. Rule is graduated on one side only—one edge in 32nds and the other edge in 64ths of an inch.
Price, each.....\$1.00

Narrow Steel Rules



No. 330 Narrow, No. 10 graduation. (32ds and 64ths.)

No. 331 Narrow, No. 11 graduation. (64ths and 100ths.)

About 3/16th inch wide, 1/25th inch thick, spring-tempered, graduated one corner each side whole length, either in 32ds and 64ths, or 64ths and 100ths.
Lengths..... 4 in. 6 in. 9 in. 12 in.
Prices.....\$0.75 \$0.90 \$1.35 \$1.65

Stainless Steel Rules No. 1000

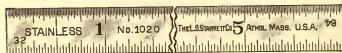


HARDENED AND TEMPERED. Will not Rust or Stain. Made of the highest grade of **STAINLESS STEEL** specially heat treated.
Graduated 8ths and 16ths on one side and 32nds and 64ths on the other.

Prices

No. 1000 6 inch; approx. 5/8 in. wide.....\$1.35
No. 1000 12 inch; " 1 " ".....2.65

Flexible Stainless No. 1020



No. 1020 Similar to No. 320, listed on page 20, except that they are made of Stainless Steel. Made in 6 inch length only.

Price, 6 inch.....\$1.35
Rules on this page packed 6 in a box.

Shrinkage Rules

For all ordinary measurements a STANDARD RULE is used, but for laying out or for working patterns, or any part of a pattern or core box, a SHRINKAGE RULE should be used. The reasons are that when a mould made from the wooden pattern in the sand is filled with molten metal, its temperature is very high, and as it cools and solidifies it contracts. Accordingly, to compensate for this, the patternmaker must add to the size of the pattern. In order that this may be done and exact relations be maintained for all dimensions a SHRINKAGE RULE is used. This rule is graduated like an ordinary rule, but if the two are compared the SHRINKAGE RULE will be found to be longer. EXAMPLE: Cast iron will shrink about $\frac{1}{8}$ inch to the foot, so the rule in reality would be $12\frac{1}{8}$ inches long, the additional length gradually being gained in the length of the rule. The contraction of different metals in the moulds varies greatly, that for cast iron being about $\frac{1}{8}$ inch to each foot, $\frac{1}{16}$ inch to the foot for brass, while for many of the softer metals it is as great as $\frac{1}{4}$ inch to the foot.

The following table is taken from Machinery's Hand Book:

SHRINKAGE OF CASTINGS

The usual allowance for each foot in length is as follows:

In large cylinders.....	$\frac{3}{16}$ in.	In zinc.....	$\frac{1}{16}$ in.
In small cylinders.....	$\frac{1}{16}$ in.	In lead.....	$\frac{1}{16}$ in.
In beams and girders.....	$\frac{1}{16}$ in.	In tin.....	$\frac{1}{4}$ in.
In thick brass.....	$\frac{3}{16}$ in.	In copper.....	$\frac{3}{16}$ in.
In thin brass.....	$\frac{3}{16}$ in.	In bismuth.....	$\frac{3}{16}$ in.
In cast iron pipe.....	$\frac{1}{4}$ in.	In malleable iron.....	$\frac{1}{8}$ in.
In steel.....	$\frac{1}{4}$ in.	In aluminum.....	$\frac{1}{8}$ in.

Republished by permission from MACHINERY'S HANDBOOK. Copyrighted, 1914, by THE INDUSTRIAL PRESS, New York.

See page 251 for Rule Holder particularly adapted to the use of Patternmakers.

Steel Shrink Rules



These rules are spring-tempered and are of the same width and thickness as Spring-Tempered Standard Rules, listed on page 17. Made with No. 4 graduation, 8ths, 16ths, 32nds and 64ths.

PRICES

6 in.....\$1.00 12 in.....\$2.10 24 in.....\$4.25

- No. 370 Shrink, $\frac{1}{8}$ to foot
- No. 372 Shrink, $\frac{1}{8}$ to foot, 6 in. only, flexible
- *No. 373 Shrink and Standard, $\frac{1}{8}$ to foot
- No. 375 Brass Shrink, $\frac{3}{16}$ to foot
- No. 376 Shrink, $\frac{1}{4}$ to foot, 12 in. only
- **No. 377 Double Shrink, $\frac{1}{4}$ to foot
- No. 378 Shrink, $\frac{3}{8}$ to foot, 12 in. only
- No. 374 Shrink, $\frac{1}{2}$ to foot, 12 in. and 24 in. only
- No. 368 " " " " " " " " " "
- No. 369 " " " " " " " " " "
- No. 388 " " " " " " " " " "
- No. 389 " " " " " " " " " "
- No. 393 " " " " " " " " " "

6 inch and 12 inch, packed 6 in a box; 24 inch, packed 1 in a package.

*No. 373 12 inch, is graduated 2 edges on one side in 64ths and 32nds, $12\frac{1}{2}$ inches long, or with $\frac{1}{8}$ inch shrink, and on the other side 2 edges in 64ths and 32nds, 12 inches long, or the standard foot for comparison.

**Double shrink is used when 2 shrinks are necessary, as in a master pattern. Take cast iron, which shrinks $\frac{1}{8}$ inch to foot, for example: a master pattern is made to make a gate pattern, the result being $\frac{1}{8}$ inch shrink, then the production piece from pattern is another $\frac{1}{8}$ inch, consequently $\frac{1}{4}$ inch shrink is used to make the master pattern.

Metric Steel Shrink Rules

These rules are spring-tempered, and of the same width and thickness as the 12 inch Shrink rules listed above.

Graduated three edges in millimeters, one edge in $\frac{1}{4}$ millimeters. Made in 30 cm. length only.

Price, each.....\$2.10

No. 468 Metric Shrink, 1 mm. to 100 mm.

No. 469 " " 2 " " 100 "

Packed 1 in a package.

Steel Rules

Metric



Spring Tempered

No. 340 Graduated three corners in millimeters, one corner in $\frac{1}{2}$ mm. The same width and thickness as our No. 300 Spring-Tempered Rules of English measure, listed on page 17.

Lengths and prices given below.

Lengths	Prices
5 cm. = 1.9685 inches.....	\$0.55
10 " = 3.9370 " .....	.75
15 " = 5.9055 " .....	.90
20 " = 7.8740 "	1.20
30 " = 11.8110 "	1.65
50 " = 19.6850 "	2.60
1 m. = 39.3700 "	10.00

Flexible

No. 345 Graduated on one side only, one corner in millimeters, the other in $\frac{1}{2}$ mm. The same width and thickness as Flexible Rules of English measure listed on page 20.

Made in the following lengths: 10, 15, 20, 30 cm. and 1 Meter.

Prices the same as for corresponding lengths listed above.

Narrow

No. 347 About $\frac{1}{8}$ inch wide, and about $\frac{1}{16}$ inch thick. Graduated one side in millimeters, the other in $\frac{1}{2}$ mm. Made in the following lengths—10 and 15 cm. Prices the same as for corresponding lengths listed above.

Rules on this page

5 cm. to 30 cm., packed 6 in a box

50 cm. and up, packed 1 in a package.

Steel Rules

Metric and English

Spring Tempered

No. 350 Graduated one corner each in millimeters, $\frac{1}{4}$ mm., 32ds and 64ths of an inch, all lengths.

Lengths	Prices
5 cm. = 1.9685 inch	\$ 0.55
10 " = 3.9370 " .....	.75
15 " = 5.9055 " .....	.90
20 " = 7.8740 "	1.20
30 " = 11.8110 "	1.65
50 " = 19.6850 "	2.60
1 m. = 39.3700 "	10.00

No. 351 Made in the following lengths—15 and 30 cm. only. The 15 cm. length graduated as follows: first corner in $\frac{1}{4}$ mm., second corner in 1 mm., third corner in $\frac{1}{4}$ inches, fourth corner in $\frac{1}{100}$ inches. The 30 cm. length graduated as follows: two inches of third corner in 64ths, the rest of that corner in 16ths of an inch. Two inches of fourth corner in 100ths, the rest of that corner in 50ths of an inch.

Flexible

No. 355 Graduated one edge in millimeters, the other in 64ths.

Made in the following lengths: 10-15-20 and 30 cm. Prices the same as for corresponding lengths listed above. Graduated on one side only.

Narrow

No. 357 Graduated one edge in millimeters, the other in 64ths.

Made in 10 and 15 cm. lengths only. Prices the same as for corresponding lengths listed above. Graduated on one edge of each side only, about $\frac{3}{16}$ inch wide and about $\frac{1}{16}$ inch thick.

English and Metric With One Beveled Edge

No. 352 Graduated on beveled edge in 64ths inch, the other edge of same side in millimeters. Reverse side, one edge graduated in 8ths, the other in 16ths of an inch. These rules are of the same width and thickness as No. 400, listed on page 19.

Lengths:	6 in.	12 in.	18 in.	24 in.
Prices:	\$0.90	1.65	2.60	3.25

Rules on this page packed

5 cm. to 30 cm., or 12 inch, 6 in a box.
50 cm., or 18 inch, and up, 1 in a package.



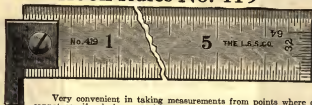
Adjustable Hook Rules No. 418

Patent Applied For



Has an improved feature whereby the hook can be adjusted to be short or long in connection with any one of the four graduations on the rule. Its construction also enables one to set calipers to any of the graduations. These features are readily recognised from the cut, as compared to our other hook rules shown on this page. The hooks are hardened and may be entirely removed or adjusted by a slight turn of the eccentric stud. Rule graduations, 64ths, 32ds, 16ths and 8ths. Made only in 6, 9, 12, 18 and 24 inch lengths. Prices same as for No. 419, listed below.

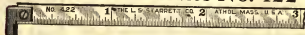
Hook Rules No. 419



Very convenient in taking measurements from points where one cannot see if rule is even with measuring edge, from round corners, thru hubs of pulleys, setting inside calipers, etc. The hook may be quickly removed by turning the eccentric stud one half turn.

PRICES		No. 418 and No. 419
6 inch.....	\$ 1.25	Our No. 303 Rule, with hook.
9 ".....	1.75	" " " " " "
12 ".....	2.15	" " " " " "
18 inch.....	3.10	Our No. 300 Rule, with hook.
24 ".....	3.75	" " " " " "
36 inch No. 419 only..	7.65	Our No. 410 Rule, with hook.
48 " No. 419 "	10.75	" " " " " "

Narrow Hook Rules No. 422



These rules, while very similar to our No. 419 line, are designed for taking measurements thru small holes. Measurements thru holes as small as $\frac{1}{16}$ inch approximately, can be obtained. Graduated on one side in 32ds, and the other in 64ths of an inch. Our No. 330 Rule, with hook.

No. 422	Lengths.....	4 in.	6 in.	9 in.	12 in.
Prices.....		\$1.00	\$1.20	\$1.65	\$2.60

Rules on this page packed
4 inch to 12 inch, inc. 3 in a box.
18 inch and up, 1 in a package.

Tempered Steel Rules With Holder

No. 423

Patented



The rules and holder shown in the above cut are actual size. It is hardly necessary to describe the utility of these little rules as the average mechanic has many times seen places where just such rules were needed. They will be found useful where it is inconvenient to use an ordinary rule as in lathe work where there are grooves and short shoulders to be turned, measuring a recess or keyway as well as the general class of tool and die work. The holder is designed to retain the rules on a 30° angle. A slight turn of the knurled handle

against a spring plunger locks the rule. The rules are graduated to read 32nds of an inch on one side and 64ths on the other. The 1-inch and $\frac{1}{2}$ -inch lengths can also be furnished graduated to 50ths of an inch on one side and 100ths on the other at the prices listed below. A few of the many positions of this tool are shown above.

PRICES

No. 423

English

Set of rules and holder comprising $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" in length with 32nds and 64ths graduations.....	\$2.50
Rules only, all lengths.....	Each .35
Holder only.....	.75

No. 423 M

Metric

Set of rules and holder, comprising 5, 10, 15, 20 and 25 mm. in length, with millimeters on one side and half-millimeter graduations on the other side.....	\$2.50
Rules only, all lengths.....	Each .35
Holder only.....	.75

Packed 1 set in a box.

Steel Rules with Thumb Slide

Hardened Rule



The rules are 6 inches long, about $\frac{1}{16}$ inch wide and $\frac{1}{8}$ inch thick. These are fitted with a thumb slide. Useful in measuring against a shoulder, the width of flanges, collars, etc. The slide may be used on either edge of the rule, or removed and the rule used alone.

No. 290
No. 297

6 inch
6 inch

No. 4 graduation
No. 7 graduation

Price, each \$2.00

Packed 3 in a box.

Steel Slide Caliper Rules No. 296



The rules are 4 inches long, $\frac{1}{8}$ inch wide and $\frac{1}{8}$ inch thick, with jaws $\frac{1}{8}$ inch deep. With No. 4 Graduation, furnished with either 32nds or 64ths graduation on the lower edge of front side, as may be desired, and 8ths and 16ths graduations on the reverse side. The thumb piece slides in a groove on the reverse side as shown in the above cut of our No. 290.

Where quick measurements are to be taken on small rods, tubing, sheet stock, etc., it is convenient to have an instrument which measures the object between two contacts. This slide caliper is highly satisfactory to any mechanic, but of extreme value in stock rooms and stores.

Price, each \$2.50

No. 296 M The above rule is furnished with graduations in millimeters and half millimeters at the same price.

Packed 3 in a box.

Steel Rules

No. 460

Folding

Made of best quality spring-tempered steel, $\frac{3}{4}$ inch wide. Graduated the first two inches in 32ds, remainder in 16ths, on one side, and 8ths of an inch on the other. Cut shows full width. Lock joints. Black finish, with large, raised bright figures and graduations.

Length	No. 460	Each	Per Dozen
2 foot, 2 fold, 12 inch joints.....		\$1.25	\$15.00
3 " 3 " 12 " "		1.75	21.00

No. 460 M & E

The same as No. 460 except that one side is graduated in Metric measure (centimeters and millimeters), reverse side 16ths of an inch.

Length	Each	Per Dozen
2 foot, 60 cm. 2 fold, 12 inch joints.....	\$1.25	\$15.00

Packed 6 in a box.

Brass Rule

No. 462

Folding, with Stop Joint

Made of hard brass. Two feet long, $\frac{3}{4}$ inch wide, 12 inch joints, 2 fold. Graduated in 8ths of an inch on one side and 16ths on the other.

PRICES

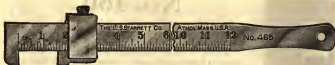
Per dozen.....	\$18.00
Each.....	1.50

Packed 6 in a box.



No. 460

Brass Hook and Handle Rule No. 465



To enable blacksmiths to more conveniently measure hot pieces, and for convenience in measuring through holes, or from the inside when held against a corner, etc., the blacksmiths' hook and handle rule has been devised. This is an ordinary rule with a hook at zero, so that by placing the hook against the work the reading may be readily made from the scale at the edge. A handle on the opposite end from the hook permits using the rule without getting the hand near the work.

These rules are made from hard rolled sheet brass $\frac{1}{16}$ of an inch thick, $1\frac{1}{8}$ inches wide, with heavy graduations and figures, graduated from the end in $\frac{1}{16}$ inch on one side, and from the inside of the hook in 16ths of an inch on the other, adapting them for taking measurements either from the hook or from the outside edge. They are graduated 12 inches, have flat handles and measure overall $16\frac{3}{4}$ inches.

PRICES

No. 465A Rule only.....\$2.25

No. 465B Rule with sliding head.....\$3.00

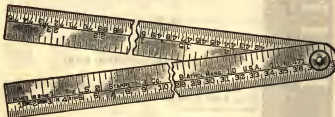
No. 465B sent unless otherwise ordered.

Packed 1 in a package.

Steel Rule

With Circumference Measurement

No. 471



Made of spring tempered steel, about $\frac{1}{16}$ inch thick and $\frac{1}{4}$ inch wide. Length 2 feet, 12 inch joints, 2 fold. Has distinct lines and figures and stop joint. One edge on one side graduated 16ths, reverse side on one edge 8ths and circumference inches by 8ths. Shows direct reading circumference measure up to 75 inches opposite the respective diameter.

Price.....\$2.50

Packed 6 in a box.

Folding Steel Pocket Rules No. 450



Made of best quality spring-tempered steel, $\frac{3}{4}$ inch wide. Graduated the first two inches in 32ds of an inch, remainder in 16ths on one side, reverse side graduated in 8ths entire length. Raised figures and double lock-joints.

No. 450

	Each	Per Dozen
1 foot, 4 inch joints 3 fold.....	\$0.45	\$ 5.40
2 " 6 " " 4 " .....	.90	10.50

Metal Bound Leather Cases—1 foot, \$0.05; 2 ft., \$0.10 each.

No. 450 M & E. The same as No. 450 except that they are graduated in Metric Measure (centimeters and millimeters) on one side, and 16ths of an inch on the other.

Feet Centimeters

	Each	Per Dozen
1 foot, 30 cm. 4 inch joints 3 fold.....	\$0.45	\$ 5.40
2 " 60 " 6 " " 4 " .....	.90	10.50

1 ft. packed 12 in a box. 2 ft. packed 6 in a box.

Folding Steel Rules No. 451



Made of best quality spring-tempered steel, $\frac{3}{4}$ inch wide, in 6 inch sections, with double lock joints, a feature patented by us. Accurately graduated, the same as our regular machinists' rules, in 8ths of an inch on one side and 16ths on the other, with large figures for easy reading.

Length	Price	Length	Price
2 foot 4 fold, each.....	\$2.00	4 foot 8 fold, each.....	\$3.25
3 " 6 " "	2.50	6 " 12 " "	6.50

2, 3 and 4 foot packed 6 in a box. 6 foot packed 3 in a box.

Ready Reference Table With Rule No. 588

Copyrighted

Spring Steel—

Quick Reading

Has decimals, fractions and 6-inch rule with 32ds divisions on one side, and tap and drill data and 6-in. rule with 64ths divisions on the other, as illustrated. Handy for toolmakers and machinists. Markings distinct and easy to read.

Note the 32ds divisions marked every 4, 8, 12, etc., lines; the 64ths divisions marked every 8, 16, 24, etc., lines—our quick reading feature on both sides.

Note also the way the rule is incorporated—no turning end for end—32ds. or 64ths always in the natural position.

Size, about 2/100ths inch thick, 1 1/4 inches wide, and 6 3/4 inches long.

Price, each.....\$0.90

Packed 12 in a box.



Handy Equivalent Tables

Made from Spring Steel

These Ready Reference Tables are but .012 inch thick, 1 1/4 inches wide, and about 6 inches long. With the black markings and polished surface they are very distinct. Carried in the pocket or used around the bench they are invaluable to machinists, tool makers, steel workers, etc.

No. 589 No. 590 No. 591

Decimal Equivalents
Price, each . . . \$0.75

Tap Drills
For Machine Screws
Price, each . . . \$0.75

Drill Size Tables
Price, each . . . \$0.75

NO. 589

THE L. S. STARRETT CO.
ATHOL, MASS. U.S.A.

DECIMAL
EQUIVALENTS

1/16	.0625
1/8	.1250
3/16	.1875
1/4	.2500
5/16	.3125
3/8	.3750
7/16	.4375
1/2	.5000
9/16	.5625
5/8	.6250
11/16	.6875
3/4	.7500
7/8	.8750
1	1.0000
1 1/16	1.0625
1 1/8	1.1250
1 1/4	1.2500
1 3/8	1.3750
1 1/2	1.5000
1 5/8	1.6250
1 3/4	1.7500
1 7/8	1.8750
2	2.0000
2 1/16	2.0625
2 1/8	2.1250
2 1/4	2.2500
2 3/8	2.3750
2 1/2	2.5000
2 5/8	2.6250
2 3/4	2.7500
2 7/8	2.8750
3	3.0000
3 1/16	3.0625
3 1/8	3.1250
3 1/4	3.2500
3 3/8	3.3750
3 1/2	3.5000
3 5/8	3.6250
3 3/4	3.7500
3 7/8	3.8750
4	4.0000

NO. 590

THE L. S. STARRETT CO.
ATHOL, MASS. U.S.A.

TAP DRILLS
FOR
MACHINE SCREW TAPS

1/16	.0625
1/8	.1250
3/16	.1875
1/4	.2500
5/16	.3125
3/8	.3750
7/16	.4375
1/2	.5000
9/16	.5625
5/8	.6250
11/16	.6875
3/4	.7500
7/8	.8750
1	1.0000
1 1/16	1.0625
1 1/8	1.1250
1 1/4	1.2500
1 3/8	1.3750
1 1/2	1.5000
1 5/8	1.6250
1 3/4	1.7500
1 7/8	1.8750
2	2.0000
2 1/16	2.0625
2 1/8	2.1250
2 1/4	2.2500
2 3/8	2.3750
2 1/2	2.5000
2 5/8	2.6250
2 3/4	2.7500
2 7/8	2.8750
3	3.0000
3 1/16	3.0625
3 1/8	3.1250
3 1/4	3.2500
3 3/8	3.3750
3 1/2	3.5000
3 5/8	3.6250
3 3/4	3.7500
3 7/8	3.8750
4	4.0000

FOR STEEL WORK USE
TAP DRILLS ONE OR TWO
SIZES LARGER THAN LIST

NO. 591

THE L. S. STARRETT CO.
ATHOL, MASS. U.S.A.

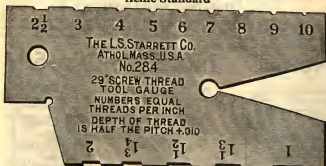
DRILL SIZE
TABLE

LETTER SIZES	
A	.2500
B	.3125
C	.3750
D	.4375
E	.5000
F	.5625
G	.6250
H	.6875
I	.7500
J	.8125
K	.8750
L	.9375
M	1.0000
N	1.0625
O	1.1250
P	1.1875
Q	1.2500
R	1.3125
S	1.3750
T	1.4375
U	1.5000
V	1.5625
W	1.6250
X	1.6875
Y	1.7500
Z	1.8125
AA	1.8750
AB	1.9375
AC	2.0000
AD	2.0625
AE	2.1250
AF	2.1875
AG	2.2500
AH	2.3125
AI	2.3750
AJ	2.4375
AK	2.5000
AL	2.5625
AM	2.6250
AN	2.6875
AO	2.7500
AP	2.8125
AQ	2.8750
AR	2.9375
AS	3.0000
AT	3.0625
AU	3.1250
AV	3.1875
AW	3.2500
AX	3.3125
AY	3.3750
AZ	3.4375
BA	3.5000
BB	3.5625
BC	3.6250
BD	3.6875
BE	3.7500
BF	3.8125
BG	3.8750
BH	3.9375
BI	4.0000
BJ	4.0625
BK	4.1250
BL	4.1875
BM	4.2500
BN	4.3125
BO	4.3750
BP	4.4375
BQ	4.5000
BR	4.5625
BS	4.6250
BT	4.6875
BU	4.7500
BV	4.8125
BW	4.8750
BX	4.9375
BY	5.0000
BZ	5.0625
CA	5.1250
CB	5.1875
CC	5.2500
CD	5.3125
CE	5.3750
CF	5.4375
CG	5.5000
CH	5.5625
CI	5.6250
CJ	5.6875
CK	5.7500
CL	5.8125
CM	5.8750
CN	5.9375
CO	6.0000
CP	6.0625
CQ	6.1250
CR	6.1875
CS	6.2500
CT	6.3125
CU	6.3750
CV	6.4375
CW	6.5000
CX	6.5625
CY	6.6250
CZ	6.6875
DA	6.7500
DB	6.8125
DC	6.8750
DD	6.9375
DE	7.0000
DF	7.0625
DG	7.1250
DH	7.1875
DI	7.2500
DJ	7.3125
DK	7.3750
DL	7.4375
DM	7.5000
DN	7.5625
DO	7.6250
DP	7.6875
DQ	7.7500
DR	7.8125
DS	7.8750
DT	7.9375
DU	8.0000
DV	8.0625
DW	8.1250
DX	8.1875
DY	8.2500
DZ	8.3125
EA	8.3750
EB	8.4375
EC	8.5000
ED	8.5625
EE	8.6250
EF	8.6875
EG	8.7500
EH	8.8125
EI	8.8750
EJ	8.9375
EK	9.0000
EL	9.0625
EM	9.1250
EN	9.1875
EO	9.2500
EP	9.3125
EQ	9.3750
ER	9.4375
ES	9.5000
ET	9.5625
EU	9.6250
EV	9.6875
EW	9.7500
EX	9.8125
EY	9.8750
EZ	9.9375
FA	10.0000
FB	10.0625
FC	10.1250
FD	10.1875
FE	10.2500
FF	10.3125
FG	10.3750
FH	10.4375
FI	10.5000
FJ	10.5625
FK	10.6250
FL	10.6875
FM	10.7500
FN	10.8125
FO	10.8750
FP	10.9375
FQ	11.0000
FR	11.0625
FS	11.1250
FT	11.1875
FU	11.2500
FV	11.3125
FW	11.3750
FX	11.4375
FY	11.5000
FZ	11.5625
GA	11.6250
GB	11.6875
GC	11.7500
GD	11.8125
GE	11.8750
GF	11.9375
GG	12.0000
GH	12.0625
GI	12.1250
GJ	12.1875
GK	12.2500
GL	12.3125
GM	12.3750
GN	12.4375
GO	12.5000
GP	12.5625
GQ	12.6250
GR	12.6875
GS	12.7500
GT	12.8125
GU	12.8750
GV	12.9375
GW	13.0000
GX	13.0625
GY	13.1250
GZ	13.1875
HA	13.2500
HB	13.3125
HC	13.3750
HD	13.4375
HE	13.5000
HF	13.5625
HG	13.6250
HH	13.6875
HI	13.7500
HJ	13.8125
HK	13.8750
HL	13.9375
HM	14.0000
HN	14.0625
HO	14.1250
HP	14.1875
HQ	14.2500
HR	14.3125
HS	14.3750
HT	14.4375
HU	14.5000
HV	14.5625
HW	14.6250
HX	14.6875
HY	14.7500
HZ	14.8125
IA	14.8750
IB	14.9375
IC	15.0000
ID	15.0625
IE	15.1250
IF	15.1875
IG	15.2500
IH	15.3125
II	15.3750
IJ	15.4375
IK	15.5000
IL	15.5625
IM	15.6250
IN	15.6875
IO	15.7500
IP	15.8125
IQ	15.8750
IR	15.9375
IS	16.0000
IT	16.0625
IU	16.1250
IV	16.1875
IW	16.2500
IX	16.3125
IY	16.3750
IZ	16.4375
JA	16.5000
JB	16.5625
JC	16.6250
JD	16.6875
JE	16.7500
JF	16.8125
JG	16.8750
JH	16.9375
JI	17.0000
JB	17.0625
JC	17.1250
JD	17.1875
JE	17.2500
JF	17.3125
JG	17.3750
JH	17.4375
JI	17.5000
JB	17.5625
JC	17.6250
JD	17.6875
JE	17.7500
JF	17.8125
JG	17.8750
JH	17.9375
JI	18.0000
JB	18.0625
JC	18.1250
JD	18.1875
JE	18.2500
JF	18.3125
JG	18.3750
JH	18.4375
JI	18.5000
JB	18.5625
JC	18.6250
JD	18.6875
JE	18.7500
JF	18.8125
JG	18.8750
JH	18.9375
JI	19.0000
JB	19.0625
JC	19.1250
JD	19.1875
JE	19.2500
JF	19.3125
JG	19.3750
JH	19.4375
JI	19.5000
JB	19.5625
JC	19.6250
JD	19.6875
JE	19.7500
JF	19.8125
JG	19.8750
JH	19.9375
JI	20.0000

Above numbers packed 12 in a box.

29° Screw Thread Gage No. 284

Acme Standard



This gage is a standard for grinding and setting tools when cutting Acme threads. Acme threads have the same depth as square threads but the sides of the thread are at an inclination of $14\frac{1}{2}^\circ$ (29° included angle). This form of thread is used extensively at the present time and has in many instances replaced the square thread in machine construction. The advantages of the Acme thread are its strength and the ease with which it can be cut compared with the square thread. The angles and edges of this gage are hardened, ground and carefully tested.

Price..... \$3.00

Center Gages



For use in grinding and setting screw cutting tools. Graduated in 14ths, 20ths, 24ths and 32nds of an inch, except No. 397 and 398, which are graduated in millimeters and $\frac{1}{2}$ mm. These graduations are useful in finding the number of threads to the inch.

PRICES

No. 390 U. S. Standard, 60° , not tempered.....	\$0.40
No. 391 U. S. Standard, 60° , spring tempered.....	.50
No. 395 Whitworth Standard, 55° , not tempered.....	.40
No. 396 Whitworth Standard, 55° , spring tempered.....	.50
No. 397 Metric, 60° , not tempered.....	.40
No. 398 Metric, 60° , spring tempered.....	.50

Packed 6 in a box.

Center Gage Attachment No. 392

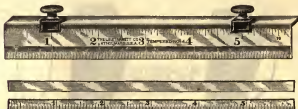
V Block with a slot above the V, for holding center gage against a lathe spindle or face plate. For both external and internal work.

Price..... \$0.50

Packed 3 in a box.



Key-Seat Rules No. 105



It is manifestly impossible to hold an ordinary rule on the cylindrical surface of a shaft and keep it parallel with the axis, while laying off measurements or drawing lines. The round surface of the work makes it difficult to hold the rule in place and it is liable to form a slight angle with the axis causing a measurement to be shorter than the true length, which should be made as it will be machined. This is an important matter when measuring lengths for splining key ways on shafting. To overcome this difficulty there have been designed rules with flanges, called key-seat rules.

The Starrett key-seat rule is an improvement over the ordinary type in that the machinist's scale is used as part of the key-seat rule. This is made possible by a device which holds two straight edges together in the form of a box square. One of these rules is a plain straight edge and the other the rule with which the machinist ordinarily works. The two edges forming the box square when applied to the surface of the cylindrical piece keep the graduated edge of the rule in a line parallel with the axis, permitting a line or series of lines to be so drawn.

The steel auxiliary straight edge is either plain or graduated in 32ds and 64ths as desired, and sent when ordered. Unless otherwise ordered the key-seat rule is sent without auxiliary straight edges.

PRICES

No.	6 in.	No.	9 in.
105 A	Without auxiliary straight edge..... \$2.70	105 D	\$3.60
105 B	With auxiliary straight edge, plain.... 3.30	105 E	4.50
105 C	With auxiliary straight edge, graduated 3.60	105 F	5.10

No. 105 A Sent unless otherwise ordered.

Packed 1 in a box.

No. 105 M

Metric

One side of scale graduated both edges in mm., the other side graduated one edge in mm. and the other in $\frac{1}{4}$ mm. The auxiliary straight edge graduated in mm. and $\frac{1}{2}$ mm.

PRICES

No.	15 cm.	No.	20 cm.
105 MA	Without auxiliary straight edge..... \$2.70	105 MD	\$3.60
105 MB	With auxiliary straight edge, plain..... 3.30	105 ME	4.50
105 MC	With auxiliary straight edge, graduated... 3.60	105 MF	5.10

Packed 1 in a box.

Key-Seat Clamps No. 298



Designed to transform any common steel scale into a key-seat rule; and a valuable addition to any machinist's kit. They are made of steel, case hardened and accurately ground. A pair weighs but an ounce. They may be put on or taken off almost instantly and are a complete substitute for a more costly tool. They may be used with our Combination Square Blades or with any straight rule with accurate results.

PRICE

Per pair \$0.75

Packed 1 pair in a box, 6 boxes in a carton.

Rule Clamp No. 299



This little tool is used to clamp two steel rules together, end to end, making one long rule. The rules may be of the same or different widths up to $1\frac{1}{4}$ in. This clamp will be of special value to mechanics, whose tool chests will usually not hold rules longer than 12 in.

Price \$0.60

Packed 4 in a box.

Steel Straight Edges

Where lines are to be scribed straight or when surfaces must be tested for their precision, an accurate standard straight edge is generally used. Straight edges are also necessary on some kinds of work for use in sighting for winding. It is needless to say that such straight edges must be absolutely dependable. We have made a line of straight edges which for accuracy cannot be excelled. The various sizes have been selected as being most convenient. The sizes given are approximate.

Not graduated. Made in pairs when two are wanted of the same width, without extra charge. The prices given are for single straight edges.

No. 380

Not Beveled



PRICES

12 in. long,	1 in. wide,	$\frac{1}{8}$ in. thick	
18 " "	$1\frac{1}{2}$ " "	$\frac{1}{8}$ " "	\$ 1.50
24 " "	$1\frac{1}{2}$ " "	$\frac{1}{8}$ " "	2.40
36 " "	2 " "	$\frac{1}{8}$ " "	3.30
48 " "	$2\frac{1}{2}$ " "	$\frac{1}{8}$ " "	6.00
60 " "	3 " "	$\frac{1}{8}$ " "	9.60
72 " "	3 " "	$\frac{1}{8}$ " "	14.40
			19.20

Packed 1 in a package.

No. 385

Beveled—One Edge Only



PRICES

12 in. long,	1 in. wide,	$\frac{1}{8}$ in. thick	
18 " "	$1\frac{1}{2}$ " "	$\frac{1}{8}$ " "	\$ 2.00
24 " "	$1\frac{1}{2}$ " "	$\frac{1}{8}$ " "	3.25
36 " "	2 " "	$\frac{1}{8}$ " "	4.50
48 " "	$2\frac{1}{2}$ " "	$\frac{1}{8}$ " "	7.20
60 " "	3 " "	$\frac{1}{8}$ " "	12.00
72 " "	3 " "	$\frac{1}{8}$ " "	18.00
			24.00

One edge only is beveled, and this to approximately $\frac{1}{8}$ inch thick from $\frac{1}{8}$ to $\frac{1}{4}$ inch back.

Packed 1 in a package.

Graduated Steel Straight Edges No. 383

Not Beveled



Graduated on one side only, one edge in 16ths and the other in 8ths of an inch.

Length Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price
12	1	$\frac{1}{16}$	\$ 2.50
18	$1\frac{1}{4}$	$\frac{1}{8}$	3.75
24	$1\frac{1}{2}$	$\frac{1}{8}$	5.00
36	2	$\frac{1}{8}$	9.00
48	$2\frac{1}{4}$	$\frac{1}{8}$	15.00

Packed 1 in a package.

No. 387

Beveled—One Edge Only



Graduated on beveled edge only in 32ds of an inch.

Length Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price
12	1	$\frac{1}{16}$	\$ 3.00
18	$1\frac{1}{4}$	$\frac{1}{8}$	4.60
24	$1\frac{1}{2}$	$\frac{1}{8}$	6.25
36	2	$\frac{1}{8}$	10.50
48	$2\frac{1}{4}$	$\frac{1}{8}$	17.50

Packed 1 in a package.

Draftsmen's Steel Straight Edges

Nickel Plated

These straight edges are made especially for draftsmen's use. They are nickel plated with dull finish, and with a hole at one end.



No. 381 Not Beveled

Length, Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price
12	1 3/4	1/4	\$1.75
15	1 3/4	1/4	2.30
18	1 3/4	1/4	2.60
24	1 3/4	1/4	3.00
30	1 3/4	1/4	4.00
36	1 3/4	1/4	5.00
42	1 3/4	1/4	6.00
48	2	1/4	7.20
54	2	1/4	8.40
60	2	1/4	9.60
72	2 1/4	1/4	12.00



No. 386 Beveled

Same as No. 381, except one edge is beveled.

Length, Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price
12	1 3/4	1/4	\$ 2.40
15	1 3/4	1/4	3.00
18	1 3/4	1/4	3.60
24	1 3/4	1/4	4.80
30	1 3/4	1/4	6.00
36	1 3/4	1/4	7.20
42	1 3/4	1/4	8.40
48	2	1/4	10.80
54	2	1/4	12.00
60	2	1/4	13.20
72	2 1/4	1/4	15.60

Above numbers packed 1 in a package.

Note: See page S-24 of Supplement for Stainless Steel Straight Edges.

Hardened Steel Straight Edges No. 382



These straight edges are accurately ground and hardened.

Length, Inches	PRICES		Price
	Approximate Width, Inches	Approximate Thickness, Inches	
1 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	\$0.65
2 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	.70
2 $\frac{3}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	.75
3 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	1.00
5 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	1.50
7 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	1.75
10 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{16}$	3.00
13 $\frac{1}{8}$	2	$\frac{1}{16}$	4.00
17	2 $\frac{1}{8}$	$\frac{1}{16}$	6.00
20 $\frac{3}{8}$	2 $\frac{3}{8}$	$\frac{1}{16}$	7.00
26 $\frac{1}{2}$	3 $\frac{1}{8}$	$\frac{1}{16}$	9.00

Packed 1 in a package.

Tempered Steel Rules with Beveled Edges No. 484



The edges are beveled on opposite sides, so that while one of the edges is always close to the paper the other stands up from it. Pressure on one edge will raise the other so that the rule can be picked up instantly. The raised edge is right to draw a pen against for inking without blotting the paper. Nickel plated, dull finish.

No. 484 is graduated in 10ths, 40ths, 50ths, and 100ths.

No. 484A is graduated in 8ths, 16ths, 32ds, and 64ths.

No. 484 and 484A.

PRICES	
6 inch.....	\$1.50
12 ".....	3.25

Packed 6 in a box.

Straight Edge Set No. 472

Narrow Edge



Small, short length straight edges have an equally important place in tool equipment, where true alignment and accuracy play a part, as those of larger proportions. With this in mind we list the above set with beveled narrow edges in leather case.

Made of tempered steel, $\frac{3}{32}$ " thick and $1\frac{19}{32}$ " wide. Six lengths as follows: $\frac{1}{4}$ ", $\frac{3}{8}$ ", 1 ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ " and 2 ".

Price, Set Complete, with Leather Case..... \$5.50

Draftsmen's Scales No. 405

Quick Reading



This scale has tilting studs, so placed that any one of the four edges with different graduations, will come in contact with the paper by its own weight when resting on the studs, with the back edge raised at an angle of about 30° . The scales are graduated in parts of inches as follows:—

No. 405 10ths, 40ths, 50ths, 100ths.

No. 405A 8ths, 16ths, 32ds, 64ths.

PRICES

Nos. 405 and 405A

6 inch with two tilting studs..... \$1.50

12 " " three " " 2.50

Packed 1 in a box.

No. 405 M

Graduated in the Metric System, one edge of each side in millimeters, the other edge in $\frac{1}{4}$ millimeters.

PRICES

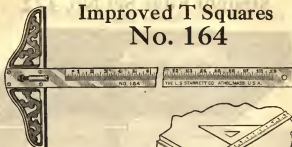
15 cm..... \$1.50

30 " 2.50

Prices for above rules of graduations, different than listed, quoted on application.

Packed 1 in a box.

Improved T Squares No. 164



Graduated

Cut No. 164 represents a nickel plated T square, with spring-tempered steel blade and aluminum head, weighing only about five ounces, and has an automatic clamping device to hold it by spring pressure against a metal straight edge attached to the end or end and side, of a drafting board or table (see description of Metal Edge, No. 168), or by a slight turn of knurled nut locked firm. The top side of the graduated blade provides a scale to set dividers. Graduated 32nds of an inch.

PRICES

22x1 1/4 inch blade, 10 inch head, graduated.....	\$ 6.60
26x1 1/4 " " " 10 " " " "	7.60
32x1 1/4 " " " 10 " " " "	8.90
36x1 1/4 " " " 13 " " " "	10.25
42x1 1/4 " " " 13 " " " "	11.50
48x1 1/4 " " " 13 " " " "	13.50

Packed 1 in a package.

Adjustable Metal Edges No. 168



Designed to be attached to end, or end and side of drafting board or table, insuring a more accurate guide for the T Square.

The cam device at the end permits fine adjustments in forming a perfect right angle when two of the metal edges or T rails are used together. By loosening the knurled hindling nut the screw can be adjusted.

The face of the metal edge is ground straight and all parts are nickel plated. An especially desirable combination when used with our No. 164 T Square.

PRICES

16 inch	\$2.85	24 inch	\$4.45	34 inch	\$6.45
18 "	3.25	26 "	4.85	36 "	6.85
19 "	3.45	27 "	5.05	38 "	7.25
20 "	3.65	28 "	5.25	40 "	7.65
21 "	3.85	30 "	5.65	48 "	9.25
23 "	4.25	32 "	6.05	60 "	11.65

Packed 1 in a package.

Draftsmen's T Squares

No. 163

Nickel Plated—Not Graduated



The heads are made of aluminum, 10 inches long, weighing only from 4 to 6 ounces, and the blades of spring-tempered steel all nicely finished and warranted accurate.

PRICES

20 inch blade, $1\frac{1}{4}$ inch wide, $\frac{3}{64}$ inch thick	\$4.60
24 " " $1\frac{1}{4}$ " " $\frac{3}{64}$ " "	4.85
30 " " $1\frac{1}{4}$ " " $\frac{3}{64}$ " "	6.35
36 " " $1\frac{1}{4}$ " " $\frac{3}{64}$ " "	6.90
48 " " $1\frac{1}{4}$ " " $\frac{3}{64}$ " "	9.00

Packed 1 in a package.

Steel Tapes

Accurate and Reliable



Ask your dealer to show you a Starrett Tape. See for yourself its many fine qualities. Bright figures and graduations on black background. Quick Reading.

See pages 44 to 61.

Steel Measuring Tapes

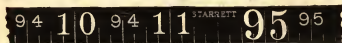
Where anything approaching correct measures of long lengths is required nothing gives such close results as a steel tape. All woven tapes will stretch or shrink, and can not be depended upon. Where accurate measurements are necessary one of our steel tapes should be used. They can be positively relied upon for quality of material, workmanship and accuracy. Each tape is carefully inspected and tested before leaving our factory.

Accuracy and Tension

Temperature standard is 68 degrees Fahrenheit. Co-efficient of expansion of steel tapes as determined by U. S. Bureau of Standards is 0.000006745 per degree Fahrenheit, amounting on a 100 foot tape to 0.00774 inch per degree. Our standard tension for tapes of ordinary lengths when supported throughout is 10 lbs. (For metric tapes, 5 kilograms.)

Quick Reading

An important feature used in our steel tapes consists in placing the foot figures before each inch mark as shown in cut below. This feature eliminates the possible chance of error in reading, and also saves time.



The dissimilarity of figures materially lessens (in fact ought to entirely obviate) the liability to erroneous readings that frequently occur through the uniformity of all figures in steel tapes of other makers.

Special attention is called to our push button handle opener as shown in the following pages. A slight pressure on the push button, on the side opposite the handle, will instantly open it. This can be done with a thick glove on as well as with the bare hand.

Black Finish

By this we designate the superior finish we put on all our steel tape lines. It produces an even black background with bright steel figures and graduations. This finish wears well.

Starrett Steel Tapes are acknowledged as standard for accuracy and convenience in reading.

Repairing Tapes

We will attend to any repairs of broken steel tapes, promptly, in a workman-like manner, and at a reasonable charge. Such tapes should be sent to our factory at Athol, Mass.—not to any of our branches—prepaid, with name of sender plainly marked on the package for identification.

Special Graduations of Tapes

Made to Order

M The tapes listed on pages 51 to 56, inclusive, can be furnished at the regular prices, graduated one side only in Metric measure as follows, the first 10 centimeters in millimeters, and balance of tape in centimeters and meters. When this style, quick reading, is desired add the letter M to tape number.

C The tapes listed on pages 51 to 56, inclusive, can be furnished graduated in feet and 12ths of a foot on one side; feet, 10ths and 100ths of a foot on the other. For price add 2 cents per foot to list price. When this style is desired add letter C to tape number.

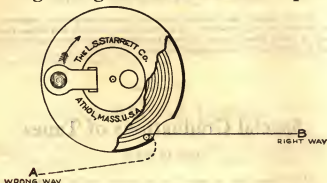
D The tapes listed on pages 51 to 56, inclusive, can be furnished graduated in feet on one side as listed, Metric measure on the other side as follows, the first 10 centimeters in millimeters; balance of tape in centimeters and meters. For price add 2 cents per foot to list price. When this style is desired add letter D to tape number.

F The tapes listed on pages 53 to 56, inclusive, can be furnished graduated on one side only in feet, inches and 16ths of an inch in place of graduation shown. For price add 5 per cent to list. When this style is desired add letter F to tape number.

L The tapes listed on pages 51 to 54, inclusive, and 56 and 57 can be furnished graduated in feet on one side as listed; links and poles (pole equals $16\frac{1}{2}$ ft. or one rod) on the other side. For price add 2 cents per foot to list price. When this style is desired add the letter L to tape number.

J The tapes listed on pages 51 to 56, inclusive, can be furnished up to 50 feet graduated in feet on one side as listed, diameter measurements on the other side, so that by measuring the circumference one is enabled to arrive at the exact diameter as fine as 64ths of inches. For price add 2 cents per foot to list price. When this style is desired add letter J to tape number.

Important Instructions Regarding the Use of Steel Tapes



1. In drawing the tape from the case at the opening, do not pull backward as at A (see cut) as this is liable to injure the tape.
2. In pulling the tape out, hold the case in a position that will avoid its being pulled against the edges of the opening. Many tapes are broken by holding the case in an awkward position, thereby preventing them running freely.
3. Occasionally tapes will pull hard and sometimes stick, which is due to their springy nature, and which prevents their being drawn back in the case in perfect alignment. This is more prevalent in large tapes. To overcome this difficulty rap the side of the case smartly against any flat surface and the tape will invariably free itself.
4. A spring wind pocket tape should not be allowed to be drawn back into the case unchecked, as it is thereby liable to become twisted or broken. It should be guided with the hand and kept straight as at B, (see cut).

Tapes only, without Cases

PRICES

Light, $\frac{1}{4}$ inch wide.						
Length, feet.....	25	33	50	66	75	
Length, meters.....	8	10	15	20	23	
Graduated one side.....	\$3.60	\$4.00	\$4.50	\$5.30	\$5.70	
Graduated two sides.....	4.40	5.10	6.00	7.30	8.10	
Heavy, $\frac{1}{4}$ inch wide with two No. 534 A one inch rings (shown on page 58).						
Length, feet.....	25	33	50	66	75	100
Length, meters.....	8	10	15	20	23	30
Graduated one side.....	\$4.20	\$5.40	\$6.80	\$8.40	\$10.20	\$12.70
Graduated two sides.....	5.20	6.60	8.40	10.70	12.70	16.10
These tapes are used in our No. 535 and No. 536 (shown on page 57).						
$\frac{1}{2}$ inch wide.						
Length, feet.....	25	33	50	66	75	100
Length, meters.....	8	10	15	20	23	30
Graduated one side.....	\$3.60	\$3.90	\$4.50	\$5.70	\$6.00	\$7.80
Graduated two sides.....	4.40	4.80	6.00	7.60	8.30	10.80
Heavy, $\frac{1}{2}$ inch wide, with snap.						
Length, feet.....					33	50
Graduated one side.....					\$5.60	\$6.50

These tapes are used in our No. 507 (shown on page 59).
For prices of special graduations which may be supplied, see page 45.

Pocket Steel Tapes

No. 500



No. 500. These tapes are $\frac{1}{4}$ inch wide, in well finished, nickel plated cases, with rounded edges. Spring wind with center stop. Graduated in inches and sixteenths of an inch.

PRICES No. 500

36 inch, each.....	\$0.85	96 inch, each.....	\$1.70
60 " ".....	1.10	120 " ".....	2.10
72 " ".....	1.20		

No. 500 F. The same as No. 500, except that they are graduated in feet, inches and sixteenths, quick reading.

PRICES No. 500 F

3 feet, each.....	\$0.85	8 feet, each.....	\$1.70
5 " ".....	1.10	10 " ".....	2.10
6 " ".....	1.20		

No. 500 A Metric. Same as No. 500, except that it is graduated on one side only, in millimeters.

PRICES No. 500 A

1 meter, each.....	\$0.85	2½ meter, each.....	\$1.70
1½ " ".....	1.10	3 " ".....	2.10
2 " ".....	1.20		

No. 548. Architect's tape—60 inch, graduated one side full length consecutive inches and sixteenths; other side containing $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch architect's scale.

Price..... **\$1.60**

No. 540. Builders' Tape—62½ inches. Graduated with $\frac{1}{8}$ inch scale from 1 to 500, on one side, and with $\frac{1}{4}$ inch scale from 1 to 250, on the other side. Specially recommended for builders, contractors and architects, as each full tape will be either a quarter or half of a thousand feet, depending on the scale of the plans, making it very simple to figure out the total length.

Price..... **\$1.75**

Above numbers packed 1 in a box; 6 boxes in a carton.

Pocket Steel Tape No. 501

Metric and English

Same style as our No. 500A but graduated in inches and sixteenths of an inch on one side, millimeters on the other side.

PRICES No. 501

Length Inches	Length Meters	Price Each
36	1	\$0.90
60	1½	1.20
72	2	1.40
96	2½	1.95
120	3	2.45



REVERSE

Above numbers packed 1 in a box; 6 boxes in a carton.

Millmen's Steel Tape No. 504

With Hook



This style of tape with markings starting from the inner side of the hook and marked consecutive inches from 1 to 144, in 16th divisions, enables workmen in steel mills, warehouses, etc., to readily measure metal sheets without assistance.

Standard ¾ inch wide ribbon. Steel case, nickel plated. Folding flush handle and push button. Diameter of case about 2½ inches.

NOTE:—Same case, with tape marked feet, inches and 16ths furnished on request for regular list-price below.

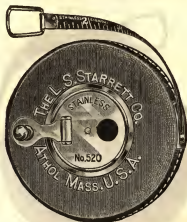
Price, No. 504, length 144 inches (12 ft.)..... \$2.70

Packed 1 in a box.

Stainless Steel Tapes No. 520 and No. 521

Quick Reading—Constant Legibility

Resistant to Corrosion under All Ordinary Conditions



With tape $\frac{3}{4}$ inch wide, leather case and push button.

Users of tapes whose work is largely in the open, where rust and corrosion play havoc, recognize in these STAINLESS STEEL TAPES a real service in maintenance and added accuracy and a time saver in reading and cleaning.

In wet tunnel work, around salt water, and in damp and dirty locations such as often prevail, the usual frequent cleanings which wear down the markings of non-stainless tapes are greatly reduced, thus prolonging the life of the tape.

On account of the properties of *stainless* tape-steel we recommend that ordinary care be used against tape being bent too sharply.

No. 520 Graduated in feet, inches and eighths of an inch.

No. 521 Graduated in feet, tenths and hundredths of a foot.

Prices

50 ft. \$10.70; 100 ft. \$19.50

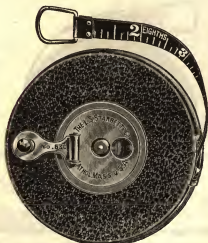
Packed 1 in a box.

Steel Measuring Tapes

No. 530

Patented

The Popular Priced Tape



An extremely moderate priced tape without sacrificing durability. Markings are bright, which, against a dark background, make them easily perceptible.

The case consists of two metal sections, covered with Athol black artificial leather, which is drawn and held in position by a concavo-convex ring. The opening in the case has a metal re-enforcement with roller, thereby preventing damage to either the case or the tape. All metal parts have bright nickel finish.

Has $\frac{3}{4}$ inch wide, quick reading tape, push button and folding handle. Graduated in feet, inches and eighths of an inch.

Length, feet.....	25	50	75	100
Price, each.....	\$2.80	\$3.10	\$4.30	\$5.30

Above sizes and listing for Domestic Trade.

For Export Trade we furnish these tapes in the above and some additional sizes, graduated Metric, Metric and English, also inches and links.

Information regarding Export list and sizes sent on request.

Note:—See page S-31 Supplement describing Tape Hooks.

Steel Measuring Tapes in Steel Cases with Push Button

No. 502

Quick Reading



The tapes are $\frac{3}{4}$ inch wide, in strong and well finished nickel plated steel cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle.

No. 502 Graduated in feet, inches and sixteenths of an inch.

Length, feet.....	25	33	50	66	75
Price, each.....	\$4.20	\$4.60	\$5.20	\$6.50	\$6.90

No. 502 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20
Price, each.....	\$4.60	\$5.20	\$6.50

No. 502 B Graduated Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75
Length, meters.....	8	10	15	20	23
Price, each.....	\$5.10	\$5.30	\$6.20	\$7.80	\$9.00

For special graduations which may be supplied, see page 45.

For price of tapes only, see page 46.

Packed 1 in a box.

Steel Measuring Tapes in Leather Cases with Push Button

No. 512

Quick Reading



These tapes are $\frac{1}{4}$ inch wide, in hard leather cases, with flush handle and push button on the opposite side, a slight pressure of which will instantly release the handle. Trimmings nickel plated.

No. 512 Graduated in feet, inches and sixteenths of an inch.

Length, feet.....	25	33	50	66	75
Price, each.....	\$4.70	\$5.00	\$5.70	\$7.10	\$7.50

No. 512 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20
Price, each.....	\$5.00	\$5.70	\$7.10

No. 512 B Graduated Metric on one side. English on the other side.

Length, feet.....	25	33	50	66	75
Length, meters.....	8	10	15	20	23
Price, each.....	\$5.20	\$5.60	\$6.70	\$8.40	\$9.00

For special graduations which may be furnished, see page 45.

For price of tapes only, see page 46.

Packed 1 in a box.

Steel Measuring Tapes in Steel Cases with Push Button No. 505 and No. 506

Quick Reading



These tapes are $\frac{3}{8}$ inch wide, in strong and well finished nickel plated steel cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle.

No. 505 Graduated in feet, inches and eighths of an inch.

No. 506 Graduated in feet, tenths and hundredths of a foot.

Length, feet.....	25	33	50	66	75	100
Price, each.....	\$4.50	\$4.80	\$5.40	\$6.90	\$7.20	\$9.30

No. 505 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20	25	30
Price, each.....	\$4.80	\$5.40	\$6.90	\$7.90	\$9.30

No. 505 B Graduated Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75	82	100
Length, meters.....	8	10	15	20	23	25	30
Price, each.....	\$5.00	\$5.50	\$6.40	\$8.20	\$8.70	\$9.50	\$11.30

For special graduations which may be supplied, see page 45.

For price of tapes only, see page 46.

Packed 1 in a box.

Steel Measuring Tapes in Leather Cases with Push Button No. 510 and No. 511

Quick Reading



These tapes are $\frac{3}{4}$ inch wide, in hard leather cases, with flush handle and push button on opposite side, a slight pressure of which will instantly release the handle. Trimmings nickel plated.

No. 510 Graduated in feet, inches and eighths of an inch.

No. 511 Graduated in feet, tenths and hundredths of a foot.

Length, feet.....	25	33	50	66	75	100
Price, each.....	\$4.90	\$5.30	\$6.00	\$7.50	\$7.80	\$10.20

No. 510 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20	25	30
Price, each.....	\$5.30	\$6.00	\$7.50	\$8.50	\$10.20

No. 510 B Graduated Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75	82	100
Length, meters.....	8	10	15	20	23	25	30
Price, each.....	\$5.40	\$6.00	\$7.00	\$8.80	\$9.30	\$10.20	\$12.20

For above tapes graduated in links and poles on reverse side, also for special graduations, see page 45.

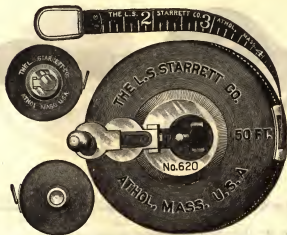
For price of tapes only, see page 46.

Packed 1 in a box.

Steel Measuring Tapes in Leather Cases, with Patent Push Button

No. 620 and No. 621

Quick Reading



These tapes are $\frac{3}{4}$ inch wide, in metal-lined leather cases, with new extension push button handle which is flush with the case when closed. Trimmings nicked.

No. 620 Graduated in feet, inches and eighths of an inch.

No. 621 Graduated in feet, tenths and hundredths of a foot.

Length, feet.....	25	33	50	66	75	100
Price, each.....	\$5.50	\$6.30	\$8.60	\$10.90	\$12.50	\$15.00

No. 620 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20	25	30
Price, each.....	\$6.30	\$8.60	\$10.90	\$13.40	\$15.00

No. 620 B and No. 621 B Graduated in Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75	82	100
Length, meters.....	8	10	15	20	23	25	30
Price, each.....	\$6.00	\$7.00	\$9.60	\$12.30	\$14.00	\$15.00	\$17.00

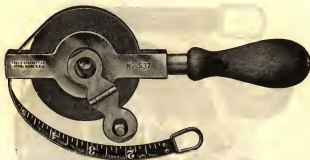
No. 620 H Graduated feet, inches and eighths of an inch on one side, links and poles on the other. For price add one cent per foot to list of No. 620.

No. 621 H Graduated feet, tenths and hundredths of feet on one side, links and poles on the other. For price add one cent per foot to list of No. 621.

Packed 1 in a box.

Reel Measuring Tapes

No. 537 and No. 538



With $\frac{3}{8}$ inch tape. Frame nicked with rosewood handle. Folding winding handle.

No. 537 Graduated in feet, inches and eighths of an inch.

No. 538 Graduated in feet, tenths and hundredths of a foot.

Length, feet.....	25	33	50	66	75	100
Price, each.....	\$5.00	\$5.90	\$7.60	\$8.70	\$10.40	\$13.00

No. 537 A Graduated Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20	25	30
Price, each.....	\$5.90	\$7.60	\$8.70	\$11.10	\$13.00

No. 537 B and No. 538 B Graduated Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75	82	100
Length, meters....	8	10	15	20	23	25	30
Price, each.....	\$5.60	\$6.70	\$8.70	\$10.10	\$12.10	\$13.20	\$15.20

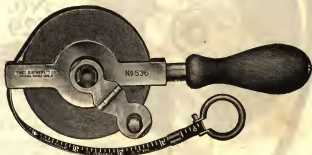
For special graduations which may be supplied, see page 45.

For price of tapes only, see page 46.

Packed 1 in a box.

Engineers' Reel Steel Tapes

No. 535 and No. 536



With $\frac{1}{4}$ inch heavy tape. Frame nickeled with rosewood handle. Folding winding handle. The tape can be readily detached from the reel. Two rings (one No. 534 A) furnished with each tape, one ring for each end.

No. 535 Graduated in feet, inches and eighths of an inch.

No. 536 Graduated in feet, tenths and hundredths of a foot.

Length, feet.....	25	33	50	66	75	100
Price, each.....	\$6.70	\$7.10	\$8.80	\$10.40	\$12.60	\$15.00

No. 535 A Graduated in Metric measure (centimeters and millimeters) the entire length.

Length, meters.....	10	15	20	25	30
Price, each.....	\$7.10	\$8.80	\$10.40	\$13.40	\$15.00

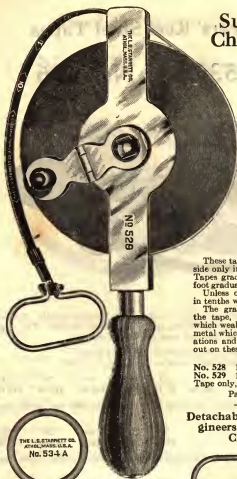
No. 535 B and No. 536 B Graduated Metric on one side, English on the other side.

Length, feet.....	25	33	50	66	75	82	100
Length, meters....	8	10	15	20	23	25	30
Price, each.....	\$7.30	\$7.80	\$9.90	\$11.90	\$14.20	\$15.50	\$17.20

For special graduations which may be supplied, see page 45.

For price on tapes only, see page 46.

Packed 1 in a box.



Surveyor's Chain Tapes

No.
528
and
No.
529

With $\frac{1}{4}$ inch heavy steel tape. Frame nickel-plated with rose-wood handle. Folding winding handle. Two detachable rings (No. 534 B), sent with each tape. Tape may be readily detached from reel and used with a ring at each end.

These tapes are graduated on one side only in feet or links and poles. Tapes graduated in feet have first foot graduated in tenths or twelfths. Unless otherwise ordered, those in tenths will be sent.

The graduations are etched on the tape, not put on with rivets which weaken the tape or with soft metal which wears off. The graduations and figures will never wear out on these tapes.

PRICES

No. 528 150 links, each... \$11.10
No. 529 100 feet, each.... 11.10
Tape only, with rings..... 7.40

Packed 1 in a box.

Detachable Rings for Engineers' and Surveyors' Chain Tapes

PRICES

No. 534 A 1 inch, round... \$1.00 pr.
No. 534 B 3 inch, oval... 1.50 pr.



Oil Gaging Steel Tapes

No. 507

½-Inch Tape—Quick Reading

• **With Lock Handle**



This tape meets the demand for a reel tape for gaging the heaviest of oils; one that will withstand severe usage. The tape ribbon being ½ inch wide is stronger and heavier than in our regular tapes and is mounted in a strong nickel-plated metal frame. The drum is cored for lightness and is about 2⅝" in diameter, and with the long winding handle assures increased leverage and in turn makes it quick and easy to operate. The winding handle is hinged to fold to the right

or left, making it possible to lock the tape at the desired length, the knob folding neatly against the frame. This feature will be appreciated when the heavy plumb bob is attached.

The plumb bob (our No. 515C), is solid brass and has a tapering point. It is 1" in diameter, 6¾" long and weighs 18 ounces. The length of the bob and the snap hook allowing the bob's quick removal is included in the markings on the tape.

The handle is hard wood and affords a full grip of the hand.

Graduated in feet, inches and 8ths of an inch on one side only.

PRICES

No. 507	With plumb bob, length 33 feet.....	\$12.30
No. 507	" " " " 50 "	14.10

Packed 1 in a box.

Oil Gaugers Steel Tapes

No. 508

$\frac{3}{8}$ inch Tape—Quick Reading
With Lock Handle—With Brass Plumb Bob



WHEN SOUNDING FOR THE BOTTOM OF THE TANK THE LOCK
HANDLE IS MOST CONVENIENT AND IS PREFERRED
BY MANY GAUGERS.

Our Black Finish, standard weight tape line, distinctly marked with bright steel figures and graduations, provide easy reading with accurate measurements. Polished hardwood handle and nickel plated frame. The lock handle permits good grip and holds the tape at any point.

Fitted with our No. 515B Solid Brass Plumb Bob $2\frac{3}{4}$ inches long, $1\frac{1}{4}$ inch diameter, weight 6 oz.

Length of bob and snap hook, which allows quick removal, is included in the markings on the tape.

Graduated in feet, inches and eighths of an inch.

PRICES

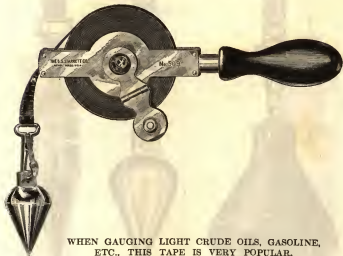
No. 508 With No. 515B Bob—25 feet, each.	\$7.30
No. 508 " " " " 33 " "	8.20
No. 508 " " " " 50 " "	9.90

We can also furnish the tapes listed above with Stainless Steel lines at an additional cost. Prices quoted upon application.

Oil Gaugers Steel Tapes

No. 509

$\frac{3}{8}$ inch Tape—Quick Reading
With Folding Handle—With Brass Plumb Bob



WHEN GAUGING LIGHT CRUDE OILS, GASOLINE,
ETC., THIS TAPE IS VERY POPULAR.

Our Black Finish, standard weight tape line distinctly marked with bright steel figures and graduations provide easy reading with accurate measurements. Polished hardwood handle and nickel plated frame.

Fitted with our No. 515B—Solid Brass Plumb Bob, $2\frac{1}{4}$ inches long, $1\frac{1}{4}$ inch diameter, weight 6 oz.

Length of hoh and the snap hook, which allows quick removal, is included in the markings on the tape.

Graduated in feet, inches and eighths of an inch.

PRICES

No. 509 With No. 515B Bob—25 feet, each.....	\$7.30
No. 509 " " " " 33 " "	8.20
No. 509 " " " " 50 " "	9.90

We can also furnish the tapes listed above with Stainless Steel lines at an additional cost. Prices quoted on application.

No. 509 may be supplied with tape line going between rolls in end of frame (as shown in cut), or inside of frame.

Plumb Bobs for Steel Tapes No. 515



No. 515 A



No. 515 B



No. 515 C

These plumb bobs are used on oil burning boats and in oil fields for gauging the oil in tanks. The attachment, as shown in the cut, is included in the measurement of the tapes. The plumb bobs may be detached from the nickel-plated snaps when not in use. The No. 515 A is made of cast iron with an enameled finish; the No. 515 B and No. 515 C are made of solid brass. We can attach these plumb bobs to any of our steel tapes at the prices listed below.

Prices, Plumb Bobs only, with Snaps.

No. 515 A	Approximate weight 13 oz.	each	\$1.90
No. 515 B	Approximate weight 6 oz.	each	2.30
No. 515 C	Approximate weight 18 oz.	each	2.80

Hooks for Steel Tapes No. 514



These hooks are made from brass castings and are nickel-plated. They are easily attached to our $\frac{1}{4}$ -inch, except pocket tapes, or $\frac{1}{2}$ -inch tapes and are designed to take measurements from the inside of the hook.

PRICES

No. 514 A	For $\frac{1}{2}$ -inch tapes	each	\$0.76
No. 514 B	For $\frac{1}{4}$ -inch tapes	each	.70

Above numbers packed 1 in a box.

Improved Mercury Plumb Bobs

No. 87

Patented

The improvement consists in our patented device for fastening the string without a knot to tie or untie, simply by drawing it into the peculiarly slotted neck at the top, after unwinding the required length, when the bob will hang perfectly true.

These plumb bobs are made from solid steel, bored and filled with mercury. Noteworthy features are their great weight in proportion to size, low center of gravity, small diameter, hardened and ground points, knurling on the body and the simple and effective device at top for fastening end of line after winding up. Nickel plated. Each is provided with a braided silk line.

PRICES

4	in. long.	$\frac{1}{2}$ in. diam.	3 $\frac{1}{2}$ oz...	\$1.80
5	" "	$\frac{3}{8}$ " "	6 " ..	2.40
5 $\frac{1}{2}$	" "	$\frac{3}{8}$ " "	12 " ..	3.00
6	" "	1 " "	16 " ..	3.60

Steel Plumb Bobs

No. 177

The same in design as No. 87, but made from solid steel, the mercury being omitted.

PRICES

4	in. long.	$\frac{1}{2}$ in. diam.	2 $\frac{3}{4}$ oz...	\$1.00
5	" "	$\frac{3}{8}$ " "	5 " ..	1.25
5 $\frac{1}{2}$	" "	$\frac{3}{8}$ " "	8 $\frac{1}{2}$ " ..	1.75
6	" "	1 " "	14 $\frac{1}{2}$ " ..	2.40

Above numbers packed 1 in a box.



Starrett Combination Squares

The combination square is, as its name indicates, a tool that can be used for the same purposes as an ordinary try-square but it differs from the try-square in that the head can be made to slide along the blade and clamp at any desired place, and combined with the square is a level and a miter. The sliding of the head is accomplished by means of a central groove in which travels a guide in the head of the square. The groove in all blades being concaved eliminates congestion of dirt, giving a free and easy slide. This permits the scale to be pulled out and used simply as a rule. It is frequently desired to vary the length of the blade of a try-square and this is readily accomplished with the combination square. It is also convenient to square a piece with a surface and at the same time tell whether one or the other is level or plumb. The spirit level in the head of the square permits this to be done without the use of a separate level. The head of the square may also be used as a simple level.

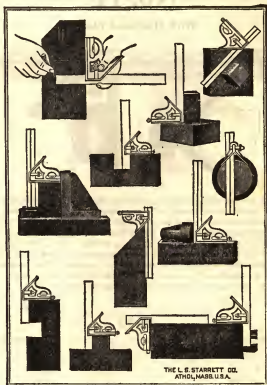
Because the blade may be moved in the head, the combination square makes a good marking gage, by setting the blade at the proper position and clamping it there. The whole combination square may then be slid along as with an ordinary gage. As a further convenience, a scriber is held frictionally in the head by a small brass bushing. The scriber head projects from the bottom of the square stock in a convenient place to take out quickly.

In laying out, preliminary to machining, the combination square may be used to scribe lines at miter angles as well as at right angles, for one edge of the square head is at 45° . Where micrometer accuracy is not essential the blade of the combination square may be set at any desired position and the square used as a depth gage to measure in mortises, or the end of the blade may be set flush with the edge of the square, and used as a height gage.

The head may be unclamped and entirely removed from the blade and a center head substituted so that the same tool can quickly be used to find the centers of shafting and other cylindrical pieces. An attachment described on a succeeding page and a second blade or rule can be clamped at any point so that lines may be drawn parallel to the head. When combined with the center head this attachment is convenient for scribing parallel chords on the ends of cylindrical work.

The hardness of the blade of this combination square prevents the corners from wearing round and destroying the graduations, thus keeping the blade at all times accurate.

This combination square combining as it does a rule, square, miter, depth gage, height gage, level, and center head permits of more rapid work on the part of the mechanic, saves littering the bench with a number of tools each of which is necessary but which may be used only rarely, and tends toward the goal for which all mechanics are striving—greater efficiency.

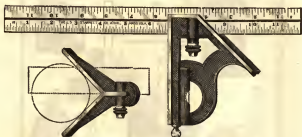


Showing a few of the many uses of
the combination square

Starrett Combination Squares

No. 11

With Hardened Blade



Every tool warranted accurate. With the adjustable blade this forms one of the most convenient and useful tools ever devised for mechanics' use. It is a complete substitute for a whole set of common try squares, and is one of the best gages made for transferring exact measurements or laying out work. It is also convenient for a depth gage, or to square in a mortise. For a miter it is perfect, while with the auxiliary center head it forms a centering square, both inside and outside, which for convenience and accuracy has no equal. The blades are hardened and graduated in No. 4 and No. 7 graduation with heavy figures, reading both ways. See page 65 illustrating the use of the combination square.

PRICES

4 inch, with center head	\$2.10, without	\$1.50
6 " " " "	2.40	1.80
9 " " " "	3.00	2.40
12 " " " "	3.60	3.00
18 " " " "	4.50	3.90
24 " " " "	5.40	4.80

The 6, 9, 12, 18 and 24 inch stocks are fitted with levels as shown in the above cut. The 4 inch stock has no level. The 18 and 24 inch have the same stock and center head as the 12 inch. These squares are sent complete unless otherwise ordered.

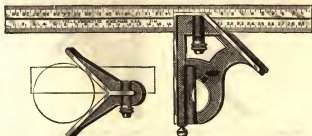
The blades are graduated in No. 4 and No. 7 graduations. Those of No. 4 graduations being most used, will be sent unless otherwise ordered.

Packed 1 in a box.

Combination Squares

No. 11M

Metric
With Hardened Blade



The same as No. 11, except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{4}$ millimeters.

PRICES

10 cm., with center head	\$2.10, without	\$1.50
15 " " " "	2.40	1.80
20 " " " "	3.00	2.40
30 " " " "	3.60	3.00
50 " " " "	4.50	3.90
60 " " " "	5.40	4.80

PRICES OF SEPARATE PARTS OF SQUARES NO. 11, NO. 11M, NO. 11 M & E, NO. 23 AND NO. 23M

	Blade	Stock	Center Head
4 inch or 10 cm.	\$0.80	\$0.90	\$0.75
6 " " 15 "	1.20	.90	.75
9 " " 20 "	1.50	1.20	.75
12 " " 30 "	1.90	1.50	.75
18 " " 50 "	3.00	1.50	.75
24 " " 60 "	3.90	1.50	.75
Scribers	.15 cents each.		

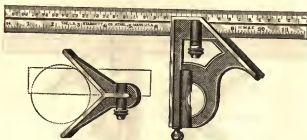
PRICES OF SEPARATE PARTS OF SQUARES NO. 33, NO. 33M AND NO. 33 M & E DROP FORGED HARDENED HEADS AND BLADES.

	Blade	Stock	Center Head
4 inch.	\$.80	\$1.50	\$1.50
6 " or 15 cm.	1.20	1.90	1.50
9 " " 20 "	1.50	1.90	1.90
12 " " 30 "	1.90	2.40	1.90
18 " " 50 "	3.00	2.40	1.90
24 " " 60 "	3.90	2.40	1.90
Scribers	.15 cents each.		

Packed 1 in a box.

Combination Squares No. 11 M & E

Metric and English—With Hardened Blade



The same as No. 11, except that the blades are graduated in Metric and English, as follows; one side graduated in $\frac{1}{2}$ millimeters and $\frac{32}{1}$ ths of an inch, the reverse side graduated in millimeters and $\frac{64}{1}$ ths of an inch.

PRICES			
10 cm., with center head	.....	\$2.10, without	\$1.50
15 " " " "	.....	2.40 "	1.80
20 " " " "	.....	3.00 "	2.40
30 " " " "	.....	3.60 "	3.00
50 " " " "	.....	4.50 "	3.90
60 " " " "	.....	5.40 "	4.80

Sent with center head unless otherwise ordered.

Packed 1 in a box.

Combination Square No. 11 S

With Shrink Graduations, for Pattern Makers

These squares are the same as our No. 11, with hardened blade, except that the blades are graduated the same as shrink rules, made in No. 4 graduation only and in $\frac{1}{8}$ inch and $\frac{1}{16}$ inch shrinkage to the foot, as listed below.

PRICES			
12 inch, with center head,	\$4.20	Without center head,	\$3.60
Sent with center head and with $\frac{1}{8}$ inch shrinkage, unless otherwise ordered.			

Blades Only

Price, 12 inch blade only, each.....\$2.70

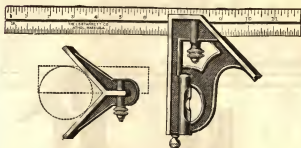
These blades are made in No. 4 graduation either $\frac{1}{8}$ inch or $\frac{1}{16}$ inch shrinkage and will fit all our 12 inch combination squares and sets, also our bevel protractors.

When ordering blades state whether $\frac{1}{8}$ inch or $\frac{1}{16}$ inch shrinkage is desired.

Combination Squares

No. 23

For Machinists and Carpenters



This square is similar in design to our No. 11, but, while the blade is made from good, hard steel, it is not hardened. Made with No. 4 graduation only.

PRICES

6 inch, with center head	.....	\$2.40, without	\$1.80
9 " " " "	.....	3.00 "	2.40
12 " " " "	.....	3.60 "	3.00

Sent with center head unless otherwise ordered.

No. 23 M

Metric

The same as No. 23, except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{2}$ millimeters.

PRICES

15 cm. with center head	.....	\$2.40, without	\$1.80
20 " " " "	.....	3.00 "	2.40
30 " " " "	.....	3.60 "	3.00

Sent with center head unless otherwise ordered.

Above numbers packed 1 in a box.

Combination Squares

No. 94

With Level, Miter and Plumb



This square will readily appeal to the carpenter and others not requiring a fine graduation of the blade or a scriber. The head may be clamped to any point of the blade. The blade is graduated 8ths and 16ths on both sides, and the lines and figures are very distinct. It is also convenient to square a piece with a surface and at the same time tell whether one or the other is level or plumb. The blade can be used separately as a rule. Combines a marking gage, rule, square, miter, depth gage, height gage, level and plumb.

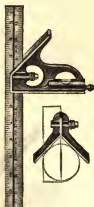
PRICES

9 inch.....	\$1.35
12 ".....	1.50

Packed 1 in a box, 100 in a case

Drop Forged Steel Combination Squares No. 33

With Hardened Heads and Hardened Blades



Both stock and center head are hardened, as well as the blade, which is graduated with heavy figures reading both ways. All sizes except 4 inch have level.

PRICES

4 inch, with center head	\$3.80, without	\$2.30
6 " " " "	4.60	3.10
9 " " " "	5.30	3.40
12 " " " "	6.20	4.30
18 " " " "	7.30	5.40
24 " " " "	8.20	6.30

The blades are graduated in No. 4 and No. 7 graduations. Sent with center head and No. 4 graduation unless otherwise ordered.

No. 33 M Metric

The same as No. 33, except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{8}$ millimeters.

No. 33 M & E Metric and English

The same as our No. 33 and 33 M, except that the blade is graduated in Metric and English as follows; one side graduated in $\frac{1}{8}$ millimeters and thirty-seconds, the reverse side in millimeters and sixty-fourths.

PRICES

No. 33 M and No. 33 M & E		
15 cm., with center head	\$4.60, without	\$3.10
20 " " " "	5.30	3.40
30 " " " "	6.20	4.30
50 " " " "	7.30	5.40
60 " " " "	8.20	6.30

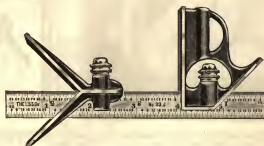
Sent with center head unless otherwise ordered.

Above numbers packed 1 in a box.

Drop Forged Steel Combination Square

No. 33 J

Small Size with 6 inch Blade
Quick Reading



Call this added size the "baby" or "junior" of Drop Forged Steel Combination Squares. Should appeal to tool and die makers. Patterned after our No. 33 line but much reduced in size and weight. The 6 inch hardened blade is also proportionately smaller with the conventional 8ths, 16ths, 32nds and 64ths graduations, the latter having quick reading figures. Weighs about 5 ounces.

PRICE

With 6 inch Blade, with Center Head	\$4.40
" " " without " "	3.50

Sent with center head unless otherwise ordered

Center Squares

No. 32



The center head on this tool is made with broader sides than on our other center heads. Its feature, while doing the work of any center head, is in connection with angle and gear work, as the broad sides taper on one side of the head only, enabling one to find centers and scribe lines on angles. The sides are $1\frac{1}{4}$ inches wide at the ends. This center head can be furnished to fit the 12, 18 and 24 inch sizes of our Combination Squares and Sets, and No. 10 Inclinometer as well as the same tools graduated in millimeters, at an advance of 50 cents each over the price with ordinary center head.

Sent with No. 4 graduation, 8ths, 16ths, 32nds, 64ths, unless otherwise ordered.

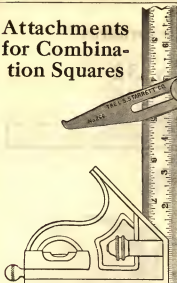
PRICES

Center head, alone.....	\$1.25
" " with 12 inch blade.....	3.15
" " " 18 " ".....	4.25
" " " 24 " ".....	5.15

Packed 1 in a box

Attachments for Combination Squares

No. 266



This attachment will adapt itself to many uses where a device of this kind is needed. It clamps to a 12-inch blade of our regular combination square, and can be used as a height gage, for scribing lines, leveling planer work, etc. It was primarily designed as a simple attachment to line up locomotive guides by placing the base of square stock against the guide, and lining with the center line of piston.

Price.....\$1.50

Packed 1 in a box.

No. 289

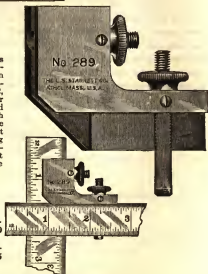
The use of this attachment is so well shown by the illustrations that a further description is hardly necessary. The attachment is made to fit the 12, 18 and 24 inch blades of our Nos. 11, 23 and 33 squares, and can be used in connection with any of our regular rules as wide as one inch, or with our flat steel Square No. 21, for laying out key seats, etc. The illustrations on the next page show just a few of the ways in which the attachment can be used.

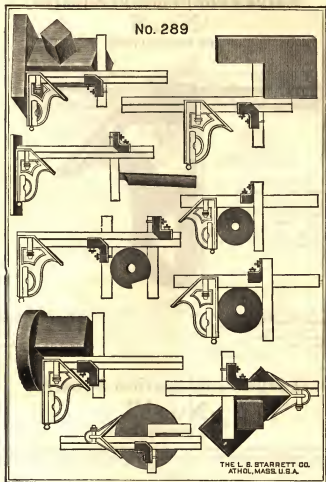
PRICE

No. 289A 1½ in. by 1¾ in.
each.....\$1.00

No. 289B 2½ in. by 2¾ in.
each.....\$1.25

Packed 4 in a box.

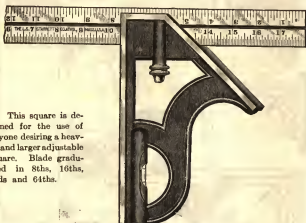




Showing our No. 289 attachment as used with
our combination squares

Large Combination Squares No. 8

With Hardened Blade



This square is designed for the use of anyone desiring a heavier and larger adjustable square. Blade graduated in 8ths, 16ths, 32ds and 64ths.

PRICES

18 in., blade $1\frac{1}{2}$ in. wide, $\frac{1}{16}$ in. thick; $8\frac{1}{4}$ in. stock, with 5 in. miter.	
Without Center Head.....	\$7.50
24 in., blade $1\frac{1}{2}$ in. wide $\frac{1}{16}$ in. thick; $8\frac{1}{4}$ in. stock, with 5 in. miter.	
Without Center Head.....	\$9.00
Center head only, for either size.....	2.25

Sent without center head unless otherwise ordered.

Large Combination Squares No. 17

With Hardened Blade

These squares are the same as our No. 11, except that the parts are a little larger, thereby increasing their usefulness. Blade graduated in 8ths, 16ths, 32ds and 64ths.

PRICES

18 in., blade $1\frac{1}{4}$ inches wide, $\frac{1}{16}$ in. thick; 6 in. stock with 4 in. miter.	
With Center Head.....	\$7.00
Without.....	\$5.50
24 in., blade $1\frac{1}{4}$ inches wide, $\frac{1}{16}$ in. thick; 6 in. stock with 4 in. miter.	
With Center Head.....	\$8.00
Without.....	\$6.50

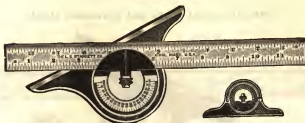
Sent without center head unless otherwise ordered.

Above numbers packed 1 in a box.

Improved Bevel Protractors

No. 12

With Hardened Blade



An adjustable rule, held firmly at any point by a thumb nut, passes through a revolving turret which is nicely graduated in degrees from 0 to 180, both right and left, and can be accurately adjusted to show any angle.

A valuable feature is, the small level attached to the head, forming an adjustable level to show any degree, thus greatly increasing the usefulness of the instrument.

This level is attached to one side of the head as shown in the small engraving. The blades are the same as those used on our No. 11 squares, and furnished with our No. 4 or No. 7 graduations. These protractors will be sent with 12 inch blades of No. 4 graduation unless otherwise ordered. The head is 7 inches long.

PRICES

9 inch, complete.....	\$4.50
12 " " ".....	4.90
18 " " ".....	6.00
24 " " ".....	6.90
Protractor Head only, with Level.....	3.00

Note: The Protractor Head for 9 inch blade is not interchangeable with the other sizes.

No. 12 M

Metric

The same as No. 12, except that the blade is graduated in millimeters and $\frac{1}{2}$ millimeters.

No. 12 M & E

Metric and English

The same as our No. 12, except that the blade is graduated in Metric and English, as follows; one side graduated in $\frac{1}{2}$ millimeters and thirty-seconds, the reverse side graduated in millimeters and sixty-fourths.

PRICES

No. 12 M Metric and No. 12 M & E Metric and English.	
20 cm.....	\$4.50
30 ".....	4.90
50 ".....	6.00
60 ".....	6.90

Above numbers packed 1 in a box.

Bevel Protractors

No. 490

With Hardened Blade and Reversible Head



This tool is of the same general design as our No. 12 Protractor, with the additional feature of having the head extend both sides of the blade. This greatly increases the usefulness of the tool, as the same angles may be transferred from either side of the frame without resetting. Another improvement is that the turret is graduated to read both ways from 0 to 180 degrees. Mechanics will clearly appreciate this point, as direct readings may be had from the turret, indicating the supplement of the angle, as well as the angle required. The fact that there is but one zero line on the frame eliminates all possible chance of confusion as to whether acute or obtuse angles are obtained.

The head of the Protractor is 7 inches long and is supplied with an accurate level attached to one side as shown by small cut. The blades are hardened and graduated with heavy figures reading both ways. The heads are made with fine smooth finish to match the finish of our No. 33 Combination Squares. The heads will also fit the blades of our No. 11 and No. 23 Combination Squares and our Combination Sets. Furnished with No. 4 or No. 7 graduation. These Protractors will be sent with 12 inch blades of No. 4 graduation unless otherwise ordered.

PRICES

9 inch, complete.....	\$5.70
12 " ".....	6.10
18 " ".....	7.20
24 " ".....	8.10
Protractor Head only, with Level.....	4.20

Packed 1 in a box.

Note: The Protractor Head for 9 inch blade is not interchangeable with the other sizes.

Bevel Protractors No. 490 M

Metric

The same as No. 490, except that the blade is graduated in millimeters and $\frac{1}{2}$ millimeters.

PRICES

20 cm., complete.....	\$5.70
30 " "	6.10
50 " "	7.20
60 " "	8.10
Protractor Head only, with Level.....	4.20

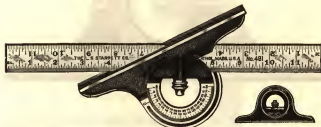
No. 490 M & E

Metric and English

The same as No. 490 and No. 490 M, except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{2}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths.

Prices the same as for No. 490 M.

No. 491



This is the same as our No. 490, except that the head is made with checked finish to match the heads of our Combination Squares No. 11. Furnished with No. 4 and No. 7 graduation. No. 4 graduation sent unless otherwise ordered. Prices the same as for No. 490.

No. 491 M

Metric

The same as No. 491, except that the blade is graduated in millimeters and $\frac{1}{2}$ millimeters.

Prices the same as for No. 490 M.

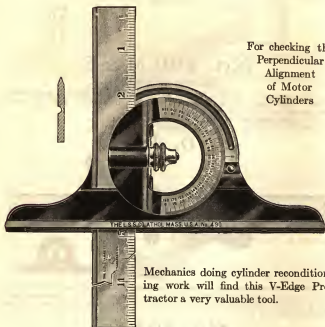
No. 491 M & E

Metric and English

The same as No. 491 and No. 491 M, except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{2}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths. Prices the same as for No. 490 M.

Above numbers packed 1 in a box.

V-Edge Protractor No. 490 B



For checking the
Perpendicular
Alignment
of Motor
Cylinders

Mechanics doing cylinder reconditioning work will find this V-Edge Protractor a very valuable tool.

Any error in alignment will be quickly detected. By ascertaining the variation between protractor head and face of block, with thickness or feeler leaves, the operator can correctly adjust the reconditioning machine.

PRICE

No. 490 B—12" complete \$6.25

Bevel Protractors

No. 492

With Hardened Blade

These are the same as our No. 12, except that the heads are made with smooth finish and match the finish of our No. 33 Combination Squares. Furnished with No. 4 and No. 7 graduation. No. 4 graduation sent unless otherwise ordered.

The turret is graduated to read both ways from 0 to 180 degrees.

PRICES

9 inch, complete.....	\$4.50
12 " "	4.90
18 " "	6.00
24 " "	6.90
Protractor Head only, with Level.....	3.00

No. 492 M

Metric

The same as No. 492, except that the blade is graduated in millimeters and $\frac{1}{2}$ millimeters.

PRICES

20 cm., complete.....	\$4.50
30 " "	4.90
50 " "	6.00
60 " "	6.90
Protractor Head only, with Level.....	3.00

No. 492 M & E

Metric and English

The same as our No. 492 and 492 M, except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{2}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths.

Prices the same as for No. 492 M.

Above numbers packed 1 in a box.

Combination Sets No. 9

With Hardened Blade



The combination square met with such universal approval from machinists that it was but a step to add to it the protractor head and have a combination set, made up of the rule on which slide the square, center, and protractor heads. This makes possible more varieties of uses in laying out and testing work than are possible with any other instrument used by mechanics.

There are a number of different combinations of the heads with different lengths and styles of rules which are shown on succeeding pages. This cut shows combination square (No. 11, page 66) with center head and 7 inch bevel protractor (No. 12, page 77), all on the No. 11 square blade. Furnished with No. 4 and No. 7 graduation. No. 4 graduation sent unless otherwise ordered.

PRICES

9 inch, set complete.....	\$6.00
12 " " ".....	6.60
18 " " ".....	7.50
24 " " ".....	8.40

No. 9 M

Metric

The same as No. 9, except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{4}$ millimeters.

No. 9 M & E

Metric and English

Same as our No. 9 and No. 9 M, except that the blade is graduated in Metric and English, as follows. One side graduated in $\frac{1}{4}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths.

PRICES

No. 9 M	Metric.	No. 9 M & E	Metric and English.
20 cm.....			\$6.00
30 ".....			6.60
50 ".....			7.50
60 ".....			8.40

Above numbers packed 1 in a box.

Combination Sets

No. 433

With Hardened Blade



This set consists of our No. 33 Combination Square with hardened drop forged stock and center head as shown on page 71 and our No. 492 Protractor Head. Furnished with No. 4 and No. 7 graduations. Sent with blades of No. 4 graduation unless otherwise ordered.

PRICES

9 inch, set complete.....	\$8.30
12 " " " ".....	9.20
18 " " " ".....	10.30
24 " " " ".....	11.20

No. 433 M

Metric

The same as No. 433 except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{4}$ millimeters.

PRICES

20 cm., set complete.....	\$8.30
30 " " " ".....	9.20
50 " " " ".....	10.30
60 " " " ".....	11.20

No. 433 M & E

Metric and English

The same as No. 433 and No. 433 M except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{4}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths.

Prices the same as for No. 433 M.

Above numbers packed 1 in a box.

Combination Sets

No. 434

With Hardened Blade



The set consists of our No. 33 Combination Square with hardened drop forged stock and center head as shown on page 71 and our Reversible Protractor Head No. 490 as shown in cut. Furnished with No. 4 and No. 7 graduation. Sent with blades of No. 4 graduation unless otherwise ordered.

PRICES

9 inch, set complete	\$9.50
12 " " "	10.40
18 " " "	11.50
24 " " "	12.40

No. 434M

Metric

The same as No. 434 except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{8}$ millimeters.

PRICES

20 cm., set complete	\$9.50
20 " " "	10.40
50 " " "	11.50
60 " " "	12.40

No. 434 M & E

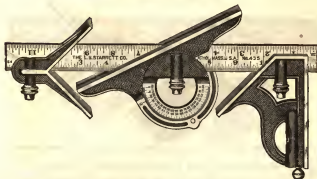
Metric and English

The same as No. 434 and No. 434 M except that the blade is graduated in Metric and English. One side graduated in $\frac{1}{8}$ millimeters and 32ds, the reverse side graduated in millimeters and 64ths. Prices the same as for No. 434 M.

Above numbers packed 1 in a box.

Combination Sets No. 435

With Hardened Blade



This set consists of our No. 11 Combination Square with hardened blade as shown on page 66 and our Reversible Protractor Head No. 491 as shown in cut. Furnished with No. 4 and No. 7 graduations. Sent with blades of No. 4 graduation unless otherwise ordered.

PRICES

9 inch, set complete.....	\$7.20
12 " " ".....	7.80
18 " " ".....	8.70
24 " " ".....	9.60

No. 435 M

Metric

The same as No. 435 except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{2}$ millimeters.

PRICES

20 cm., set complete.....	\$7.20
30 " " ".....	7.80
50 " " ".....	8.70
60 " " ".....	9.60

No. 435 M & E

Metric and English

The same as No. 435 and No. 435 M except that the blade is graduated in Metric and English. One side is graduated in $\frac{1}{2}$ millimeters and 32ds, the reverse graduated in millimeters and 64ths. Prices the same as for No. 435 M.

Above numbers packed 1 in a box.

Inclinometers

No. 10

With Hardened Blade



The above cut represents an inclinometer try square and bevel protractor combined.

It is compact, convenient, and a complete and perfect substitute for several costly tools.

It consists of a stock and disc both slotted to receive the blade, which folds in the stock. The blade attached to the graduated rotary disc may be secured at any angle from 0 to 90 degrees, and by loosening the clamp screw it may be shortened or extended full length, or removed for a straight edge.

The working face of the stock, extending both sides of the blade, admits of its being reversed, so that the same angle may be laid off in opposite directions without changing the angle in the tool, thus requiring but $\frac{1}{4}$ of a graduated circle to obtain all angles both ways.

At 90 degrees, the blade brings up against a case-hardened screw, accurately adjusted, thus forming a try square; by holding the blade perpendicular (the level in the stock being at right angles), a plumb; by folding the tool, a level, length of blade.

The blades are graduated in 8ths, 16ths, 32ds and 64ths.

PRICES

With 12 inch blade, without center head.....	\$6.00
" 18 " " " " " "	7.00
" 24 " " " " " "	8.00

Center bead, to fit all sizes.....	8.00
Center bead, to fit all sizes.....	.90

Sent without center head unless otherwise ordered.

No. 10 M

Metric

The same as No. 10, except that the blade is graduated three edges in millimeters and one edge in $\frac{1}{4}$ millimeters.

PRICES

PRICES					
With 30 cm. blade, without center bead.....					\$6.00
" 50 " " " " "					7.00
" 60 " " " " "					8.00

Center head, to fit all sizes.....	90
------------------------------------	----

Sent without center bead unless otherwise ordered.

Above numbers packed 1 in a box.

Double Protractor No. 16



This protractor blade closes in the stock either way against a stop, making a square, plumb and level. With a 24 inch blade it weighs but $1\frac{1}{4}$ pounds. The turret is graduated on both sides, one in degrees, the other to show pitch to the foot, so that the blade may be set by the graduation for laying off angles to any degree or any pitch, and the opposite branch of the stock will be right to lay out, the complementary angle without mental calculation or error, for valley roofs, bridge work, stair gages, etc. The levels are so arranged that work can be leveled up to any degree or pitch underneath or on top of a roof, rafter, stair stringer, etc.

As a square or protractor with the sliding blade it can be used in places where a fixed blade could not and is a substitute for a whole kit of squares from the shortest to the full length of blade, making a depth gage for squaring in mortises and transferring measurements. It may be used in place of the carpenter's old time steel square with the advantage of being packed in a chest without taking up so much room.

Without the blade the stock may be used in contracted places as a 6-inch level and plumb, while with an 18 or 24 inch blade, a level and plumb of corresponding length is obtained. Altogether this tool makes a combination that will be appreciated by every progressive mechanic.

PRICES

With 12 inch blade.....	\$8.15
" 18 " "	9.25
" 24 " "	10.15
Stock only.....	6.25

The 12 inch, 18 inch, and 24 inch blades of our combination squares will fit the protractor stock.

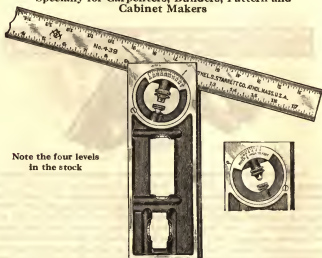
Furnished with No. 4 graduation. Protractor with 12 inch blade, No. 4 graduation sent unless otherwise ordered.

Packed 1 in a box.

Combination Tool No. 439

Patented

Specially for Carpenters, Builders, Pattern and
Cabinet Makers



Note the four levels
in the stock

The success of our combination square and combination set led us to develop a combination tool for carpenters and builders. In this one instrument there are combined seven ordinary tools—rule, square, level, protractor, level, pitch-to-foot indicator and plumb. It consists of a stock 9 inches long, with sliding blade, 18 or 24 inches in length and $1\frac{1}{2}$ inches in width, with No. 4 graduation. The blade is adjustable through the revolving turret in the stock, which is graduated on one side in degrees, with two rows of figures reading either right or left, and on the other side, graduated to show pitch-to-foot, the graduations showing $\frac{1}{2}$ inch pitch (See small cut). With levels set in each side of the stock any incline by degrees or pitch-to-foot can be leveled either on top or under the work.

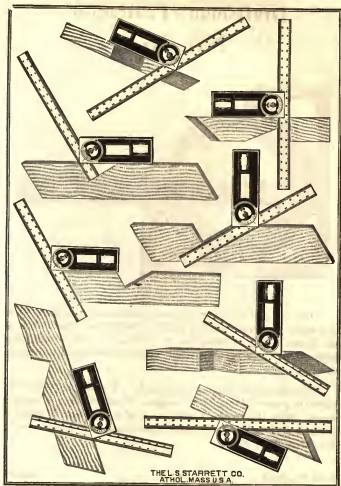
The combination tool is also used for laying out or for cutting for valleys or hips of different pitch. The blade is first set to show the pitch desired. Then place the face of the stock against the work and draw a line against the blade; then place the square end of the stock against the work and draw the complementary line, which will give the complementary angle without mental calculation. For a try-square it is far superior to the carpenters' two-foot square, which cannot be folded to put in the chest nor can the blade be shortened when it meets obstructions. Neither can the carpenters' square be used as a level or plumb or depth gage as can this simple tool.

After using this combination tool a short time carpenters will find it very convenient in laying out many kinds of complicated work which otherwise would require considerable calculation. It is a very compact tool, weighing less than three pounds.

PRICES

18 inch.....	\$10.50
24 ".....	12.50

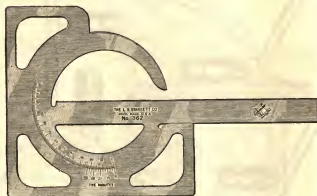
Packed 1 in a box



Showing a few applications of our No. 439
Builders' Combination Tool

Draftsman's Protractor

No. 362



This is a protractor for draftsmen, which can be quickly set to any angle, used either side up and on either of the outside edges of the frame. Very advantageous in dividing a circle, transferring angles or laying off any given angle, without resetting, on either side of a line.

This protractor forms an extension for a T square and very often takes the place of 45° and 60° triangles. Graduations are clear and sharp. With the vernier it reads to $\frac{1}{12}$ of a degree or 5 minutes. Blade is $8\frac{1}{2}$ inches long, frame approximately 6 inches square. Furnished nickel plated.

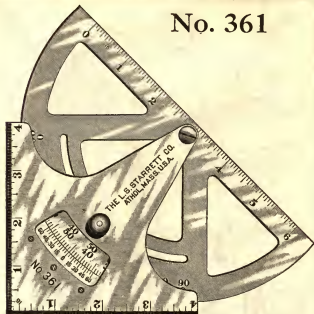
Price No. 362A.....	\$13.50
" No. 362B, With Leather Case	16.50
Case only.....	3.00

No. 362B sent unless otherwise ordered.

Packed 1 in a box.

Draftsmen's Protractor

No. 361



This protractor is made of sheet steel, nickel-plated, graduated in degrees and figured to read from either right or left— with vernier to read in five minutes. The three straight edges of the protractor are graduated in inches and 16ths, the longer part 6 inches. The tool will lie flat on the paper. The knurled locking nut is convenient for picking up the instrument. To obtain the complement of an angle without resetting, place the opposite straight part of the stock against the T-square or straight edge of a drawing board, and the reverse angle can be obtained by placing the straight part of the arc against the T-square or straight edge. By loosening the binding nut, friction is taken off, making it easy to adjust to degrees, when the tool may be again firmly locked.

This is a high grade protractor and one greatly appreciated by draftsmen.

PRICES

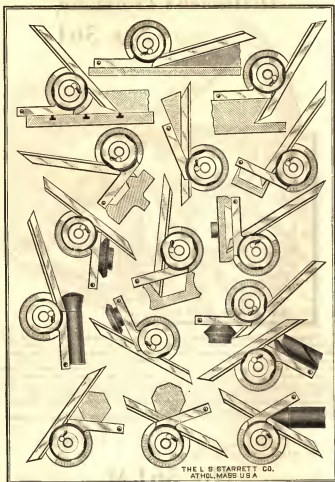
No. 361 A.....	\$12.50
No. 361 B, With Leather case.....	15.00
No. 361 B sent unless otherwise ordered.	

No. 361 M

Metric

The same as No. 361, except that the three straight edges are graduated in millimeters.

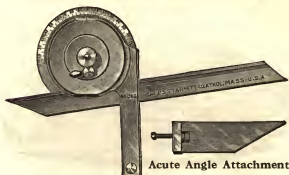
Prices, same as for No. 361.
Above numbers packed 1 in a box.



Showing a few of the various uses of
Universal Bevel Protractors

Universal Bevel Protractors

No. 360



When angles other than 90° and 45° are to be laid off, a protractor must be used because all angles are not obtainable with a square or bevel. The Starrett Universal Bevel Protractor is a graduated disc with a fixed blade and adjustable stock. Any given angle may be laid off or measured by setting the stock at that angle by the graduated disc. This tool has a very wide range of usefulness as shown by the illustrations on page 92.

The blade is either 7 or 12 inches by $\frac{1}{4}$ inch and the stock is 4 inches long; both are made from sheet steel nicely finished. The tool weighs 6 ounces. The disc is graduated in degrees from zero to 90° each way and rotates the entire circle on a center stud. The blade, clamped by an eccentric stud against the end of the disc, may slide back and forth its full length or turn through any angle around the circle and be clamped firmly at any point. It is thus adapted to positions impossible with other protractors and renders unnecessary the use of the common bevel in transferring angles.

One side of the center being flat makes it a convenient tool for laying on paper in drafting and it has double the utility of any similar tool.

The attachment shown in the small cut will be found convenient in obtaining small angles.

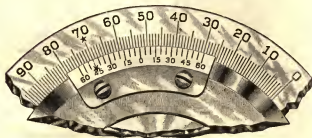
PRICES

No. 360 A With 7 inch blade.....	\$13.50
No. 360 B " 7 " " in leather case.....	15.75
No. 360 C " 12 " "	14.75
No. 360 D " 12 " " in leather case.....	17.75
No. 360 E " both 7 and 12 inch blades.....	15.50
No. 360 F Same in leather case.....	18.50
No. 360 G Acute angle attachment, extra.....	3.00

No. 360 B sent unless otherwise ordered.

Packed 1 in a box.

How to Read Universal Bevel Protractor with Vernier



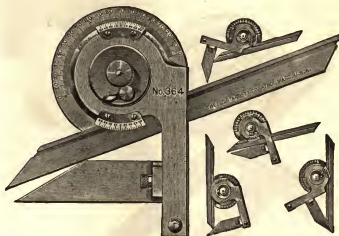
The disc of the protractor is graduated in degrees from 0 to 90° each way. The Vernier plate is graduated so that 12 divisions on the Vernier occupy the same space as 23 degrees on the disc. The difference between the width of one of the 12 spaces on the Vernier and two of the 23 spaces on the disc is therefore $\frac{1}{12}$ of a degree.

Each space on the Vernier is $\frac{1}{12}$ of a degree, or five minutes shorter than two spaces on the disc. If a line on the Vernier coincides with a line on the disc and the protractor is rotated until the next line on the Vernier coincides with the next line but one on the disc, the Vernier has been moved through an arc of $\frac{1}{12}$ of a degree, or 5 minutes.

To read the protractor, note on the disc the number of whole degrees between 0 on the disc and 0 on the Vernier. Then count in the same direction the number of spaces from 0 on the Vernier to a line that coincides with a line on the disc. Multiply this number by 5 and the product will be the number of minutes to be added to the number of whole degrees.

EXAMPLE: In the above cut the number of degrees between 0 on the disc and 0 on the Vernier is 52. The line (45) on the Vernier coincides with the line (70) on the disc, as indicated by the stars, the number of spaces on the Vernier from 0 being 9. Multiplying this number by 5 gives 45, the number of minutes to be added to the number of degrees. The reading of the protractor is therefore 52 degrees and 45 minutes (52° 45').

Universal Bevel Protractors with Vernier and Acute Angle Attachment No. 364



This protractor is the same as our No. 360 described on page 93, except that it is made with verniers reading five minutes or one-twelfth of a degree.

The verniers are so placed with relation to the graduated half circle as to make the protractor readable by vernier in any position. The protractor stock is 4 inches long and has either a 7 or a 12 inch blade, $\frac{3}{4}$ inch wide. With the 7 inch blade, the tool weighs but six ounces. The disc is graduated in degrees from 0 to 90 each way and rotates the entire circle on a central stud inside the case. The blade, clamped by an eccentric stud against the edge of the disc may be slipped back and forth its full length, or turned at any angle around the circle and firmly clamped at any point. Attention is called to the fact that the figures on the vernier are placed close to the lines, thus making it easy to read the tool when taking measurements. Attention is also called to the central locking nut on this protractor. By a slight turn of this nut the protractor is firmly held in position. The acute angle attachment enables the user to obtain very small angles.

For directions how to read the vernier, see page 94.

PRICES

No. 364 A	With 7 inch blade	\$18.50
No. 364 B	" 7 " " in leather case	20.50
No. 364 C	" 12 " " " " " "	19.75
No. 364 D	" 12 " " " " " "	22.75
No. 364 E	" both 7 and 12 inch blades	20.50
No. 364 F	Same as E in leather case	23.50
No. 364 G	Acute Angle Attachment, only	3.00

No. 364 B sent unless otherwise ordered.

Packed 1 in a box

Improved Universal Bevel Protractors No. 359

With Extremely Fine Adjustment (Patented)



The protractor shown on this page is similar in design to our No. 364 except that the dial is graduated to degrees the entire circle and is equipped with a vernier and has encased a positive method for fine adjustments. This method of fine adjustment as well as other adjustments being all controlled from the center on the front side of the tool justifies its being called an Improved Universal Bevel Protractor. The lower nut locks the dial in its rotative path, and the middle nut at a slight downward pressure engages the fine adjusting device while the upper nut locks the blade at any point in its length. The acute angle attachment renders it available for obtaining small angles.

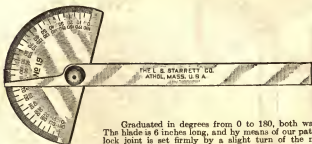
PRICES

No. 359 A	With 7 inch blade	\$22.50
No. 359 B	" 7 " " in leather case	24.50
No. 359 C	" 12 " " " " " " "	23.75
No. 359 D	" 12 " " " " " " "	26.75
No. 359 E	" both 7 inch and 12 inch blades	24.50
No. 359 F	Same as E in leather case	27.50
No. 359 G	Acute Angle Attachment, only	3.00

No. 359 B sent unless otherwise ordered.

Packed 1 in a box.

Steel Protractor No. 19

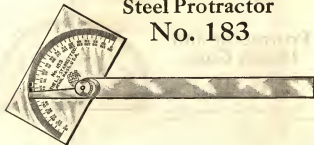


Graduated in degrees from 0 to 180, both ways. The blade is 6 inches long, and by means of our patent lock joint is set firmly by a slight turn of the nut. The back of the tool is flat. This protractor is accurate, and is convenient for setting bevels, for transferring angles, as a small T-square, or for a large number of other uses which will readily occur to a machinist or draftsman, and will be found reliable and very satisfactory by any mechanic, especially those who do not care to pay for a more expensive tool. A very handy tool, within certain limits, for checking the clearance on cutters. Ideal for use on end mills and for cutters which do not have an arbor through the hole when sharpening and when the diameter of the cutter is not more than 6 inches.

Price.....\$2.50

Packed 1 in a box.

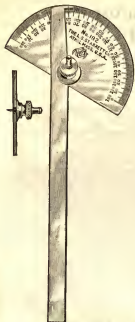
Steel Protractor No. 183



Similar to No. 19 but with rectangular head, giving four working faces, also two rows of figures reading both ways to show the complementary degrees. The blade is 6 inches long and by means of our patent lock joint is set firmly by a slight turn of the nut. The back of the tool is flat, the protractor accurate, nicely finished, and convenient for a draftsman or machinist for setting bevels, transferring angles, or for use as a T-square, etc.

Price.....\$3.00

Packed 1 in a box.



Steel Protractor No. 182

This protractor is designed particularly for field engineers, for plotting drawings requiring lines to radiate from the center of a working point to any degree point desired. In use, the fulcrum pin containing the needle or cone point is withdrawn from the protractor hub and bradded into the central point from which lines are to radiate, then the hub of the protractor is slipped on to it, when the working edge of the blade will line through the needle point to any degree desired. When not in use the needle is drawn back, held frictionally and safely carried telescoped in the hub.

The protractor has a 6 inch blade, lies flat on paper, weighs but three ounces, is positively accurate, and is much appreciated by field engineers and draftsmen.

Supplied with one needle and one cone point.

Price.....\$3.00

Packed 1 in a box.

Protractor and Depth Gage No. 493

This tool will readily be appreciated by machinists, draftsmen and shop foremen. Any angle in one-half of a circle (180°) may be obtained and the back is finished to permit its being laid flat upon the paper or work. The blade being adjustable permits its being set at any length within its capacity, permitting its use as a depth gage. The scale, which is clamped by a conveniently knurled nut, is graduated on one side to read by 32ds of an inch, and on the other by 64ths of an inch.

Price.....\$3.00

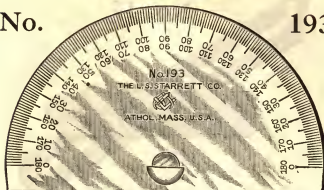
Packed 1 in a box.



Steel Protractor

No.

193

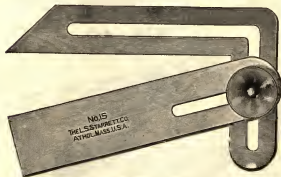


Used for setting bevels No. 15, No. 47 and No. 49 at any desired angle, thus converting them into Bevel Protractors at slight cost.

Price..... \$1.75

Packed 2 in a box.

Universal Bevel No. 15



The set-off in the blade increases its capacity and usefulness for bevel gear work, etc., so that any angle, however slight, may be obtained.

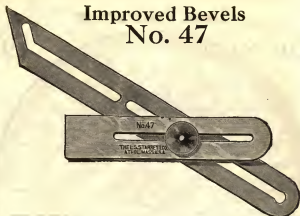
Another valuable feature is, one edge of the case being solid, a rest is formed directly under the blade, where thin templets may be placed and accurately fitted. It is also useful in working the draft on patterns and in turning angles on the lathe which cannot be reached with an ordinary bevel.

May be used with No. 193 Protractor listed above.

Price 3 inch..... \$2.25

Packed 1 in a box.

Improved Bevels No. 47



The advantages of this bevel over any other tool of this kind made, consist in its having not only the blade slotted but the stock as well, thus admitting adjustments that cannot be obtained with a common bevel. The clamping screw head, which the cut does not show, is let into a rabbet, flush with the surface of the stock allowing it to lie flat on the work.

May be used with No. 193 as a bevel protractor.

PRICES

6 inch (length of stock	3 1/4 inches)	\$2.25
9 " " " "	4 3/4 " "	2.75
12 " " " "	6 " "	3.75

Combination Bevel No. 49

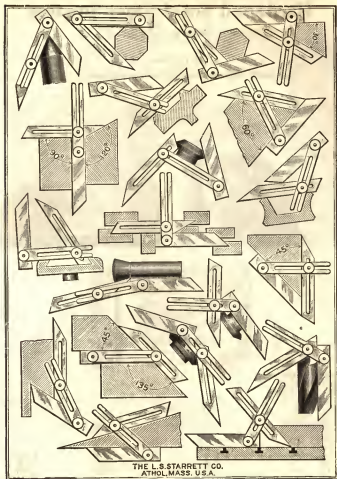


This bevel has a stud riveted in the straight edge stock or head, on which its split blade is hinged, so as to swing over the stock and be clamped at any angle. The slotted auxiliary blade with clamp bolt may be slipped on to the split blade and be clamped at any desired angle and used, in combination with the stock of the other, for laying out work, measuring, or showing any angle desired, and when so combined will lie flat upon its work. The stock is about 4 inches long.

May be used with our No. 193 Protractor listed on page 99.

Price.....\$2.50

Above numbers packed 1 in a box.

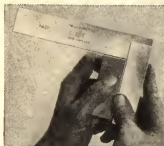


Showing some of the many uses of
No. 49 Combination Bevel

Hardened Solid Steel Squares No. 20

Not Graduated

Specially recommended as a standard square



Showing
Stock Support

Case

Length of Blade
from the inner
edge of the beam
to the end of
Blade

1	inch
1½	inches
2	"
3	"
4½	"
6	"
9	"
12	"
15	"
18	"
24	"
36	"

Length of Beam
1 inch
1½ inches

1½	"
2½	"
3½	"
4½	"
5½	"
7	"
8½	"
10½	"
12½	"
13½	"

Price
\$3.00
3.60
3.90
4.50
6.90
9.00
13.50
18.00
30.00
38.00
54.00
115.00

Wood Case
Extra

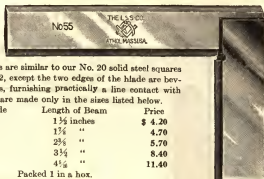
.....
.....
.....
.....
.....
\$3.00
3.25
3.75
5.00
5.50
7.00
10.00

The 15, 18 and 24 inch squares have a stock support as shown in cut.
Packed 1 in a box.

Note: Prices for larger sizes quoted on application.

Hardened Beveled Edge Squares No. 55

SECTIONAL
VIEW OF
BLADE



These squares are similar to our No. 20 solid steel squares shown on page 102, except the two edges of the blade are beveled on both sides, furnishing practically a line contact with the work. They are made only in the sizes listed below.

Length of Blade	Length of Beam	Price
1 1/4 inches	1 1/4 inches	\$ 4.20
2 "	1 3/4 "	4.70
3 "	2 3/4 "	5.70
4 1/2 "	3 3/4 "	8.40
6 "	4 1/2 "	11.40

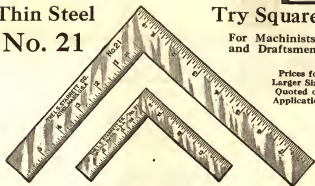
Packed 1 in a box.

Thin Steel No. 21

Try Squares

For Machinists
and Draftsmen

Prices for
Larger Sizes
Quoted on
Application



PRICES

2x1 inch 1/16 inch thick, grad.	16ths, 64ths one side; 32ds, 64ths other	\$2.10
3x2 "	" " " " " " " "	2.70
4x3 "	" " " " " " " "	3.60
6x4 "	" " " " " " " "	5.10
8x6 "	" " " " " " " "	6.60
10x8 "	" " " " " " " "	8.10
12x8 "	" " " " " " " "	9.60

No. 21 M

Metric

The same as the No. 21 except the graduation is in millimeters and 1/2 millimeters on both sides.

PRICES

5 cm.	\$2.10	15 cm.	\$5.10
10 "	3.60	20 "	6.60

Above numbers packed 1 in a package.

Graduated Hardened Steel Squares

No. 63



The above cut represents a hardened, solid steel try square. This square has concave depressions in each side of the stock which not only reduce its weight but make it more convenient to hold between the thumb and finger while being used. The stocks are case-hardened, the blades hardened to spring-temper and graduated in 32ds of an inch on one side and 64ths on the other.

PRICES

2 inch blade, full length of beam	1 $\frac{1}{2}$ inch	\$ 3.00
3 " " " " " "	2 " "	3.90
4 " " " " " "	2 $\frac{3}{4}$ " "	5.70
6 " " " " " "	3 $\frac{3}{4}$ " "	7.50
9 " " " " " "	5 " "	12.00
12 " " " " " "	6 $\frac{1}{2}$ " "	14.40

No. 63 M

Metric

The same as No. 63, except that the blade is graduated in millimeters on one side and $\frac{1}{2}$ millimeters on the other side.

PRICES

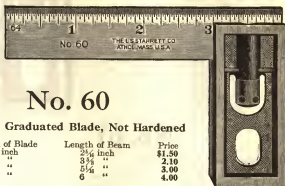
5 cm.	\$ 3.00
10 " "	5.70
15 " "	7.50
20 " "	12.00
30 " "	14.40

Above numbers, packed 1 in a box.

“Reliable” Try Squares

The following cut represents a line of Try Squares, attractive in design, light and convenient. The blade is firmly held by our patent bolt and nut, by means of which the tool can be readily taken apart, and when worn the blade and stock can be reground or lapped, and put together again as good as new.

Graduated one side in 64ths, as shown by illustration, and in 32nds on the other side.



No. 60

With Graduated Blade, Not Hardened

Length of Blade	Length of Beam	Price
4 inch	2 $\frac{5}{16}$ inch	\$1.50
6 "	3 $\frac{3}{4}$ "	2.10
9 "	5 $\frac{1}{4}$ "	3.00
12 "	6 "	4.00

No. 60 M

Metric

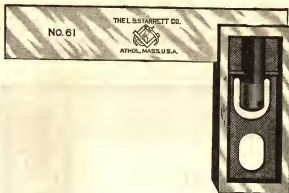
The same as No. 60, except that the blades are graduated in millimeters on one side and $\frac{1}{2}$ millimeters on the other side.

PRICES

10 cm.	\$1.50
15 "	2.10
20 "	3.00
30 "	4.00

Above numbers packed 1 in a box.

"Reliable" Try Squares



No. 61

With hardened blade, not graduated.

Length of Blade	Length of Beam	Price
4 inch	2 $\frac{5}{8}$ inch	\$ 1.50
6 "	3 $\frac{5}{8}$ "	2.10
9 "	5 $\frac{1}{8}$ "	2.75
12 "	6 "	3.75
18 "	9 "	14.00
24 "	12 "	21.00

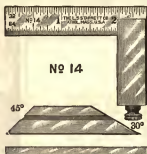
The 18 inch and 24 inch sizes of No. 61 Squares are equipped with the convenient stock support as illustrated, which projects beyond the side of the stock, or, when not in use, is contained wholly within the stock, and may be clamped firmly in either position.



Sizes 4 inch to 12 inch, inclusive, packed 1 in a box.
18 inch and 24 inch, 1 in a package.

Double Steel Squares No. 14

With Hardened Head and Blades



This cut represents a double steel square, with a $2\frac{1}{4}$ inch sliding blade, and is especially designed for tool makers. The rule being narrow and instantly adjusted to any length, however short, allows it to be used where it would be impossible to use any square with a fixed blade. The blade is graduated on one side only, in 32ds and 64ths.

Fitted to go with this stock, we make not only a bevel blade, 45° on one end and 30° on the other, but a very narrow straight one, about $\frac{1}{4}$ -inch wide, highly appreciated by die makers for squaring small holes, both of which blades will be sent with the square unless otherwise ordered.

PRICES

No. 14 A	Square.....	\$3.25
No. 14 B	" with either bevel or narrow blade.....	3.55
No. 14 C	" complete.....	3.85
No. 14 D	With larger stock, approximately $2\frac{1}{4}$ inches long, and 4 inch sliding blade, graduated in 32nds and 64ths on one side and 8ths and 16ths on the other. A narrow blade is not furnished with this size.....	4.00
No. 14 E	Same as No. 14 D with bevel blade added.....	4.50

Bevel blade will be sent with No. 14 B unless otherwise ordered.

No. 14 M

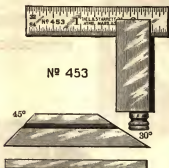
Metric

The same as No. 14 except that the blade is graduated in millimeters and $\frac{1}{2}$ millimeters.

Prices the same as for No. 14.

Above numbers packed 1 in a box.

Die Maker's Square No. 453



The object in view in designing this tool was to provide means whereby the blade could be adjusted at an angle, with the beam. This makes an excellent gage for filing the clearance in dies, etc., as shown by the sectional view.

By releasing the small screw in the stock, (see sectional view) the fulcrum pin is forced back, and the blade clamped firmly to its seat and then used as a regular square. Fitted to take the narrow and bevel blades, the same as our No. 14 Square, shown on page 108.

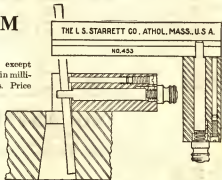
PRICES

No. 453 A	Square.....	\$4.00
No. 453 B	Square, with either bevel or narrow blade.....	4.30
	Bevel blade will be sent with No. 453 B, unless narrow ordered.	
No. 453 C	Square, complete.....	4.60
	No. 453 C sent unless otherwise ordered.	

No. 453M

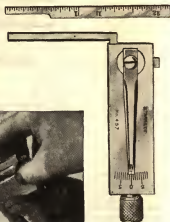
Metric

The same as No. 453 except that the blade is graduated in millimeters and half millimeters. Price same as for No. 453.



Above numbers packed 1 in a box.

Improved Die Makers' Square No. 457



A tool and die makers' square with degree markings on the stock or beam and an offset blade, so light is unobstructed in small holes. Useful for getting angles and drafts on patterns.

Angle measuring capacity is 16 degrees, 8 degrees either side of 0, the angle of the blade being indicated by the line on the pointer.

The offset blade $\frac{1}{8}$ inch wide, beveled on each edge to give a line contact, protrudes from the square about $1\frac{1}{2}$ inches.

The straight and graduated blade is $\frac{1}{8}$ inch wide, and $2\frac{1}{4}$ inches long. Graduated 64ths on one side; 32ds on the other. Attention is called to the narrow end of this blade. For $\frac{1}{2}$ inch length it has a width of $\frac{3}{32}$ inch.

The beam dimensions of this square are approximately $\frac{1}{4}$ inch wide, $11\frac{3}{32}$ inch thick and $2\frac{1}{16}$ inches long.

Beam and blades are hardened and ground.

PRICES

No. 457 A	Square, with straight blade only	\$4.50
No. 457 B	" " offset	5.00
No. 457 C	" " complete with straight and offset blades	5.50
No. 457 C complete sent unless otherwise ordered.		

No. 457M

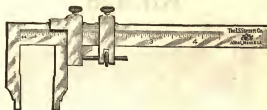
Metric

The straight and graduated blade is 58 mm long. Graduated in millimeters on one side; $\frac{1}{2}$ millimeters on the other. Otherwise this square is similar to No. 457 as shown above.

No. 457 MA	Square	\$4.50
No. 457 MB	" " offset	5.00
No. 457 MC	" " complete with straight and offset blades	5.50

No. 457 MC sent unless otherwise ordered.

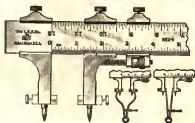
Above numbers packed 1 in a box.



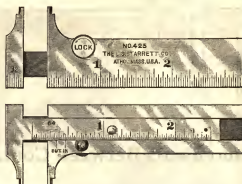
Measurements Between Contacts

The instruments described on preceding pages of this catalogue are such that it is necessary to judge by the eye the position of the edge or point to be measured in relation to a certain graduation on the tool. For some kinds of work this is sufficiently accurate and for others it is the only method possible. But where the distance between two surfaces, either external or internal is to be measured, it is frequently difficult to place the edge of a rule in a position that will allow accurate determination of the distance. To meet the requirements for this kind of measuring, instruments having two points of contact are necessary and are described on the following pages.

With these tools one surface is generally fixed and the other adjustable so that the fixed contact may be placed against one surface and the adjustable contact brought up against the other. There is then no possibility of a mistake, for the distance may be read direct from the scale.



Pocket Slide Calipers No. 425



Graduated in 32ds on the stock and 64ths on the slide. The improved clamping device, with left hand thread, (see cut), is a valuable feature as it may be locked by the thumb of the same hand in which the tool is held. The two lines on the stock as shown in lower cut enable the user to get either inside or outside measurements.

Size	Depth of Jaws	Nibs When Closed	Price
3 inch	11/16 inch	.125	\$4.00
5 "	1 7/16 "	.250	5.00

No. 425 A

Same as No. 425, except that it is graduated in 32ds on the stock and 100ths on the slide. Prices and dimensions the same as for No. 425.

No. 425 M

Metric

Same as No. 425, except that the graduations are Metric.

The 7 cm. is graduated in 1/2 millimeters on slide and millimeters on stock.

The 13 cm. is graduated in millimeters on one edge and 1/2 millimeters on the other edge of slide, and in millimeters on stock.

Size	Depth of Jaws	Nibs When Closed	Price
7 cm.	11/16 inch	3 mm.	\$4.00
13 "	1 7/16 "	6 "	5.00

No. 425 M & E

Metric and English

Same as No. 425, except that the graduations are in 1/2 millimeters on one edge and 64ths inch on the other edge of slide, and in 32ds inch on the stock.

Size	Depth of Jaws	Nibs When Closed	Price
3 inch or 7 cm.	11/16 inch	.125 or 3 mm.	\$4.00
5 " " 13 "	1 7/16 "	.250 " 6 "	5.00

Above numbers packed 1 in a box.

Leather cases for above, 3 inch size	\$0.35
" " " " 5 " "	.45

Button Gage No. 431



This gage is the same size and similar to our No. 425 Pocket Slide Caliper. The difference is that this gage is graduated on the slide to 40ths of an inch. Stock graduated in 32nds on the front.

Special attention is called to the fact that every fifth line is figured, so as to assist the user to more quickly read the 40ths, as shown in the cut.

The 3 inch size has a range of 2 inches for both external and internal measurements, while the 5 inch size has a range of $3\frac{1}{4}$ inches.

PRICES

3 inch	\$4.00
5 "	5.00

Packed 1 in a box.

Slide Rule Caliper and Circumference Gage No. 424



Useful to Rope or
Cordage Manufacturers

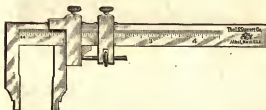
This gage has a double function—being graduated to read the circumference as well as the diameter of the object measured, the relation of circumference to diameter being shown by the graduations on upper corners of the rule (capacity $3\frac{1}{4}$ inches, about 11 inches circumference). It was originally designed for rope or cordage manufacturers. It makes a first-class slide rule caliper of large scope, opening $3\frac{1}{4}$ inches. The jaws, being $1\frac{1}{4}$ inches deep, will caliper a cylinder up to $2\frac{3}{4}$ inches in diameter. The rule is graduated in 32nds of an inch standard and 16ths of an inch circumference measure. All corners of the tool are rounded smooth to make it fit to carry in the pocket and agreeable to handle. The circumference measure will assist in calculating how many feet a minute the cutting tool in a lathe is doing on any diameter within the scope of the gage and so help determine whether the tools should have a faster or slower speed.

RULE.—The circumference being shown by the gage, multiply the same by the speed the lathe runs per minute and the result will show the number of inches or feet the circumference is running and the tool cutting.

Price	\$4.75
-------------	--------

Packed 1 in a box.

Caliper Squares No. 426



This caliper square is designed both for inside and outside measurements. It is made with firm and adjustable jaw. The beam is graduated on one side in 64ths and on the other in 100ths of an inch. With the adjusting screw the sliding head can be more accurately set to the graduations. Width of nibs when closed, .250. Depth of jaws; size A, $1\frac{1}{4}$ inch, sizes B and C, $1\frac{1}{2}$ inch.

Die Sinkers find this tool very valuable.

PRICES

No. 426 A	3 inch, without case	\$ 8.00	with case	\$ 9.75
No. 426 B	4 " " "	10.20	" " "	11.95
No. 426 C	6 " " "	12.00	" " "	14.50

No. 426 M

Metric

The same as No. 426 except that the beam is graduated on one side in $\frac{1}{2}$ millimeters and on the other in millimeters.

PRICES

No. 426M B	10 cm. without case	\$10.20	with case	\$11.95
No. 426M C	15 " " "	12.00	" " "	14.50

No. 426 M & E

Metric and English

The same as No. 426, except that the beam is graduated on one side in $\frac{1}{2}$ millimeters and on the other in 100ths of an inch.

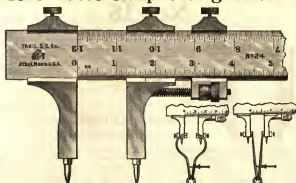
PRICES

No. 426 M&E B	4 inch, without case	\$10.20	with case	\$11.95
No. 426 M&E C	6 " " "	12.00	" " "	14.50

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Caliper Gages No. 24



This gage is specially adapted to the tire industry, in measuring tire molds, and by affording greater scope than any tool of its kind made, and is valuable in many other lines. The beams are $1\frac{1}{4}$ inches wide, .085 inch thick and are furnished in 12, 18, 24, 36 and 48 inch lengths, and are graduated in 8ths, 16ths, 32nds and 64ths. The head or jaws carry auxiliary tram points and may be removed so that the beam may be used separate as a rule. Attachments are also made to slip on and off the ends of the caliper so they may be used to set inside or outside calipers for making close or drive fits, etc. The inside calipers are set against the inside face of gage and resting on the seat of the attachments keep them in perfect line. The outside calipers are set against an extended seat of the attachment in line with the inside faces of the gage so that both inside and outside calipers may be set to agree with each other. This gage may not only be set by the graduated beam but varied by the micrometer adjusting nut to read in thousandths. The beam and attachments, like the jaws, are hardened and ground insuring long service. The jaws are 1 inch wide when closed and are furnished having 2 inch depth.

PRICES

12 inch.....	\$15.75
18 ".....	17.50
24 " (For checking flywheel gears).....	20.00
36 ".....	24.00
48 ".....	31.50

No. 24 A Larger Size

Especially Adapted to the Use of Automobile Tire Manufacturers

The same as No. 24 except that the jaws are 4 inches deep and the beam has a stiffening rod the entire length which is placed on the 32nds and 64ths graduated side. Made in 48 inch length only.

PRICE

48 inch.....	\$50.00
--------------	---------

No. 24 M Metric

The same as No. 24 except that the beam is graduated in millimeters and half millimeters and the adjusting nut in hundredths of a millimeter. The jaws when closed are 25 mm. wide.

PRICES

30 cm.....	\$15.75
50 ".....	17.50
60 ".....	20.00
90 ".....	24.00

Above numbers packed 1 in a box.

Micrometer Caliper Squares No. 28



This instrument enables one to enlarge or decrease work one or more thousandths from that calipered, and fills the bill for both a first-class caliper square and micrometer of large scope and quick adjustment. The jaws of the 4 inch and 6 inch sizes are $1\frac{1}{2}$ inches deep, while those of the 12 inch size are $2\frac{1}{2}$ inches deep, and are hardened ground and lapped. One side of the beam is graduated in 64ths and the other in 40ths; and either side may be used as a common caliper square, or, through the micrometer, to show 1,000ths full length, on either inside or outside work. This is done by first setting the line on the movable jaw to agree with any division nearest the size wanted. Fasten it there, release binding clasp, and turn the micrometer nut to agree with the indicating line on the clasp; now tighten this, release movable jaw and turn micrometer nut, counting 1,000ths, adding to or taking from the division shown on beam at the starting point.

An excellent feature of this instrument is the spiral spring between jaw and clasp, which not only takes up all backlash, but limits the pressure against the work to the strength of the spring. This is instantly felt through released pressure on the nut, and prevents springing the jaws, thus calipering to a nicety. The nibs are ground and the width when closed is .250 or $\frac{1}{4}$ inch on the 4 inch and 6 inch, and .300 on the 12 inch.

PRICES			
4 inch.....	\$13.00	With case.....	\$15.00
6 ".....	16.00	" ".....	18.50
12 ".....	25.00	" ".....	29.50

No. 28 M

Metric

The same as No. 28, except that the beam is graduated on one side in $\frac{1}{2}$ millimeters and on the other in millimeters. The micrometer head is graduated to read in 100ths of a millimeter. The width of the nibs when closed on the 10 and 15 cm. is 6 mm. On the 20 and 30 cm. the width is 8 mm.

No. 28 M & E

Metric and English

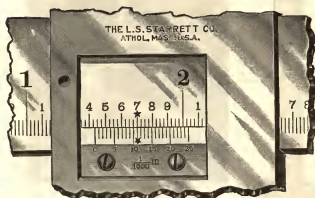
The same as No. 28, except that the beam is graduated on one side in $\frac{1}{2}$ millimeters and on the other in 100ths of an inch. The micrometer head is graduated to read in 100ths of a millimeter. The width of the nibs when closed on the 10 and 15 cm. is 6 mm. On the 20 and 30 cm. the width is 8 mm.

PRICES No. 28 M and No. 28 M & E			
10 cm. or 4 inch.....	\$13.00	With case.....	\$15.00
15 " " 6 ".....	16.00	" ".....	18.50
20 " " 9 ".....	21.00	" ".....	22.50
30 " " 12 ".....	25.00	" ".....	29.50

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

How to Read Height Gage or Caliper With Vernier



The bar of the tool is graduated in fortieths or .025 of an inch, every fourth division, representing a tenth of an inch, being numbered. On the Vernier plate is a space divided into twenty-five parts and numbered 0, 5, 10, 15, 20, 25. The twenty-five divisions on the Vernier occupy the same space as twenty-four divisions on the bar.

The difference between the width of one of the twenty-five spaces on the Vernier and one of the twenty-four spaces on the bar is therefore $\frac{1}{25}$ of $\frac{1}{40}$ or $\frac{1}{1000}$ of an inch. If the tool is set so that the 0 line on the Vernier coincides with the 0 line on the bar, the 0 line to the right on the Vernier will differ from the 0 line on the bar by $\frac{1}{1000}$ of an inch; the second line by $\frac{2}{1000}$ of an inch and so on. The difference will continue to increase $\frac{1}{1000}$ of an inch for each division until the line 25 on the Vernier coincides with the line 24 on the bar.

To read the tool, note how many inches, tenths (or .100) and fortieths (or .025) the 0 mark on the Vernier is from the 0 mark on the bar; then note the number of divisions on the Vernier from 0 to a line which exactly coincides with a line on the bar. **EXAMPLE:** In the above cut the Vernier has been moved to the right one and four-tenths and one-fortieth inches (1.425), as shown on the bar, and the eleventh line on the Vernier coincides with a line, as indicated by the stars, on the bar. Eleven-thousandths of an inch are therefore to be added to the reading on the bar and the total reading is one and four hundred and thirty-six thousandths inches. (1.436)

Vernier Calipers No. 122



These calipers are graduated in either or both English and Metric divisions for outside and inside measure, and are warranted accurate. Points are placed on the beams and slides for setting dividers to transfer distances. Full directions for using the Vernier are sent with each caliper.

The jaws are hardened, ground and lapped, parallel to each other, assuring accurate measurements at any contact points of the jaws.

We can furnish a quarter inch cylindrical plug standard for testing the adjustment of the caliper when desired. Price \$4.50.

These calipers are sent with finely finished, plush lined case.

No. 122

Graduated to read by means of the Vernier in 1000ths of an inch.

Size	Depth of Jaws	Width of Nibs When Closed	Price, each	Case, extra
4 inch	1 $\frac{1}{4}$ inch	.250	\$21.00	\$2.35
6 "	1 $\frac{3}{8}$ "	.250	24.00	2.75
9 "	2 $\frac{1}{8}$ "	.300	27.60	3.75
12 "	2 $\frac{3}{8}$ "	.300	30.00	4.00
24 "	2 $\frac{3}{4}$ "	.300	42.00	7.00
36 "	3 "	.500	90.00	15.00
48 "	3 "	.500	165.00	25.00

Sent with case unless otherwise ordered.

Packed 1 in a box.

Prices for larger sizes quoted on application.

Vernier Calipers No. 122 M

Metric

The same as No. 122, except that it is graduated on the front to read by means of the Vernier in 50ths of a millimeter and is graduated on the back in $\frac{1}{4}$ millimeters.

Size	Depth of Jaws	Width of Nibs when closed	Price, each	Case extra
100 mm.	39.7 mm.	6 mm.	\$21.00	\$2.35
150 "	39.7 "	6 "	24.00	2.75
200 "	60 "	8 "	27.60	3.75
300 "	60 "	8 "	30.00	4.00
600 "	60 "	8 "	42.00	7.00

Sent with case unless otherwise ordered.

No. 122 M & E

Metric and English

The same as No. 122, except that it has a Vernier on each side and is graduated to read by means of the Verniers, on the front in 50ths of a millimeter and on the back in 1,000ths of an inch, with jaws ground to Metric widths as on No. 122M.

Size	Price, each	Case extra
100 mm. or 4 inch.....	\$21.00	\$2.35
150 " " 6 ".....	24.00	2.75
200 " " 9 ".....	27.60	3.75
300 " " 12 ".....	30.00	4.00
600 " " 24 ".....	42.00	7.00

Sent with case unless otherwise ordered.

No. 122 E & M

English and Metric

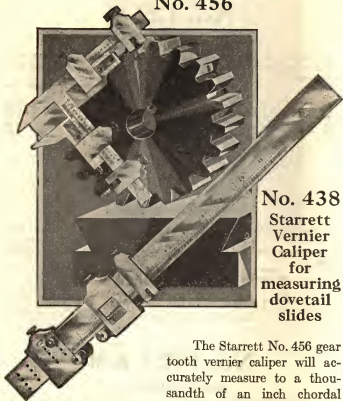
The same as No. 122, except that it has a Vernier on each side and is graduated to read by means of the Verniers on the front in 1,000ths of an inch and on the back in 50ths of a millimeter, with jaws ground to English widths as on No. 122.

Size	Price, each	Case extra
4 inch or 100 mm.....	\$21.00	\$2.35
6 " " 150 ".....	24.00	2.75
9 " " 200 ".....	27.60	3.75
12 " " 300 ".....	30.00	4.00
24 " " 600 ".....	42.00	7.00

Sent with case unless otherwise ordered.

Above numbers packed 1 in a box.

Starrett Gear Tooth Vernier Caliper No. 456



No. 438
Starrett
Vernier
Caliper
for
measuring
dovetail
slides

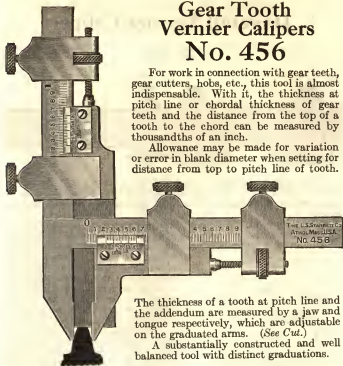
The Starrett No. 456 gear tooth vernier caliper will accurately measure to a thousandth of an inch chordal thicknesses of gear teeth and the distance from the top of a tooth to the chord. It is indispensable for work on gears, gear cutters and hobs.

The Starrett No. 438 dovetail vernier caliper will conveniently measure any dovetail whether 45, 50, 55 or 60 degree angle by positioning the indexing head which is always in correct relation to the graduations on the bar.

Gear Tooth Vernier Calipers No. 456

For work in connection with gear teeth, gear cutters, hobs, etc., this tool is almost indispensable. With it, the thickness at pitch line or chordal thickness of gear teeth and the distance from the top of a tooth to the chord can be measured by thousandths of an inch.

Allowance may be made for variation or error in blank diameter when setting for distance from top to pitch line of tooth.



The thickness of a tooth at pitch line and the addendum are measured by a jaw and tongue respectively, which are adjustable on the graduated arms. (See Cut.)

A substantially constructed and well balanced tool with distinct graduations.

PRICES

No. 456A

English

Reads by thousandths of an inch.
20 diametral to 2 diametral pitch.

With Leather Case.....\$42.75
Without Case.....40.00

No. 456B

English

Reads by thousandths of an inch.
10 diametral to 1 diametral pitch.

With Leather Case.....\$63.00
Without Case.....60.00

No. 456M-A

Metric

Reads by fiftieths of a millimeter.
1 1/4 m/m to 12 m/m module.

With Leather Case.....\$42.75
Without Case.....40.00

No. 456M-B

Metric

Reads by fiftieths of a millimeter.
2 1/4 m/m to 25 m/m module.

With Leather Case.....\$63.00
Without Case.....60.00

Sent with case unless otherwise ordered.

Dovetail Vernier Caliper

No. 438

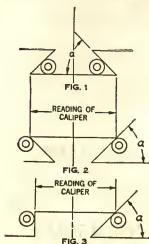


This caliper will prove a valuable asset to any manufacturer's tool equipment where dovetail work is involved. With the vernier it measures by thousandths of an inch from 0 to approximately 12 inches.

Heretofore dovetails were commonly gaged by using pieces of round wire or standard plugs, keeping them in contact with angle sides and below the upper edges or corners of the dovetail. Then caliper the overall or inside distance of the wires, as the case might be for male or female dovetails, and consult a formula. The result: considerable time and expense which is eliminated by using this caliper.

The reading of the caliper is the distance invariably given on drawings from corner to corner of the dovetail, the direct measurement being obtained by the buttons in contact with the sides of the angle. See figures 1, 2, and 3 which correspond to like figures on the sliding jaw. A taper plug locates this slide in relation to the construction and angle required. The locating pin and buttons are hardened, ground and lapped.

The range of application, 45°, 50°, 55°, and 60° angle, leaves little to be desired in this tool.



POSITION OF BUTTONS
IN RELATION TO READING
OF CALIPER

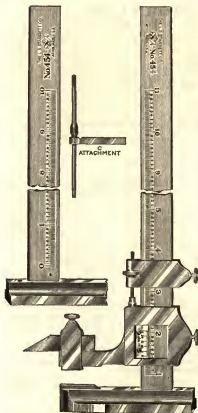
Price \$50.00
Case extra 4.00

Sent with case unless otherwise ordered.

Packed 1 in a box.

Vernier Height Gage No. 454

English, Metric, and English and Metric Measure
10-inch Gage



Measurements by use of the Height Gage are generally obtained in connection with the Tool Makers' Buttons (our No. 494 page 127) in locating the center distance of bushings in jigs, dies, etc., or in ascertaining the height of projections from a plane surface. The bar is graduated to read by means of the Vernier to $1/1000$ inch, and is graduated to read from 0 to 10 inches inside of jaws, and from 1 inch to 10 inches outside of jaws, enabling this gage to be used for either inside or outside measurements.

To explain: On the front side, when the jaws are closed the lines at 0 on both bar and Vernier plate will coincide, and the tool is designed for outside measurements only. On the reverse side, draw the movable jaw back to point where lines at 0 of both Vernier plate and bar coincide, the distance from the bottom of the base to the top of the movable jaw now equals 1 inch, and the tool is designed for inside measurements only. The hardened base is recessed in the bottom and ground and lapped square with the bar, allowing the gage to stand upright. An extension or scriber, as shown in cut on the movable jaw is also furnished which allows reverse measurements to be taken from the top or bottom side of the jaw. This extension permits measurements over projections and is hardened, ground, and lapped to a point so that a line or series of lines may be drawn and spaced as required in laying out of dies, etc.

A valuable feature in connection with this gage is the attachment by which measurements may be taken inside the frame of a jig or in ascertaining the depth of recesses, etc., which could not readily be accomplished in the ordinary way. All measurements outside only.

The rod shown with this attachment is 6 inches long, and is held by a spring bushing and nut similar to a chuck. It can be readily adjusted to approximate measurements, after which accurate measurements can be had with the Vernier.

See page 124 for prices, page 117 for directions. For offset scriber, see page 125.

Vernier Height Gage No. 454

PRICES

No. 454—10-inch Gage

Graduated to read by means of the Vernier to 1/1000 inch.

No. 454 A	Vernier Height Gage with attachment C.....	\$43.75
No. 454 B	without attachment C.....	40.00
No. 454 C	Attachment only.....	3.75
	Plush-lined case, extra.....	5.00
No. 454 A with case, sent unless otherwise ordered.		

No. 454 M Metric

Graduated to read to 1/50 mm. on one side and $\frac{1}{2}$ mm. on the other.

Prices the same as for No. 454—10 inch.

No. 454 E & M English and Metric

Graduated to read to 1/50 mm. on one side and to 1/1000 of an inch on the other.

All measurements outside only.

Prices the same as for No. 454—10 inch.

No. 454—18-inch Gage

ENGLISH MEASURE. From $1\frac{1}{4}$ inches to 18 inches by thousandths of an inch. Graduated on one side only.

No. 454 F	Vernier Height Gage with attachment H.....	\$96.00
No. 454 G	without attachment H.....	90.00
No. 454 H	Attachment only.....	6.00
	Wood case, extra.....	7.50
No. 454 F with case, sent unless otherwise ordered.		

No. 454 M—46 cm. Metric

METRIC MEASURE. From 40 mm. to 46 cm. by 50ths of a millimeter.

Prices the same as for No. 454—18 inch.

No. 454 E & M English and Metric

ENGLISH AND METRIC MEASURE. From $1\frac{1}{4}$ inches to 18 inches by thousandths of an inch on one side, from 40 mm. to 46 cm. by 50ths of a millimeter on the other side.

No. 454—24-inch Gage

ENGLISH MEASURE. Graduated to read from $1\frac{1}{4}$ inches to 24 inches by thousandths of an inch. Graduated on one side only.

24 inch—without case.....	\$170.00
24 inch—with case.....	180.00

No. 454 E & M English and Metric

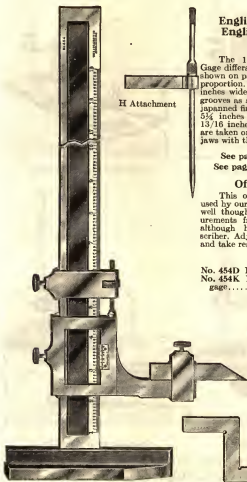
ENGLISH AND METRIC MEASURE. From $1\frac{1}{4}$ inches to 24 inches by thousandths of an inch on one side, from 40 mm. to 60 cm. by 50ths of a millimeter on the other side.

Prices same as for No. 454—24 inch.

Above numbers packed 1 in a box.

Note:—No. 454—36-inch can be furnished when desired. Price quoted upon application.

Vernier Height Gage No. 454



**18 inch.
English, Metric, and
English and Metric
Measure**

The 18-inch Vernier Height Gage differs from our 10-inch Gage shown on page 123 in its range and proportion. The bar is about $1\frac{1}{4}$ inches wide, $\frac{1}{4}$ -inch thick, and the grooves as shown in the cut have a japanned finish. The base is about $5\frac{1}{4}$ inches long, $2\frac{1}{4}$ inches wide, $13/16$ inches high. Measurements are taken only on the outside of the jaws with this tool.

See page 124 for prices.

See page 117 for directions.

Offset Scriber

This offset foot or scriber is used by our own tool makers and is well thought of. It makes measurements from the base possible, although held like the straight scriber. Adjust to plane with base and take reading for working point.

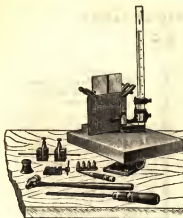
PRICES

No. 454D For 10 inch gage. . \$2.00

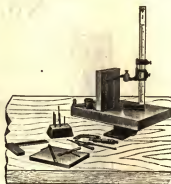
No. 454K For 18 and 24 inch
gage..... 3.00



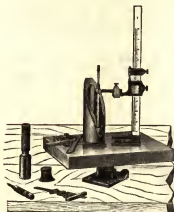
Offset Scriber



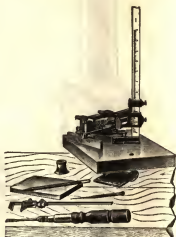
The Scriber in Use



Used with No. 494 Buttons



Use of Attachment



Checking Drill Jig Bushing

Showing some uses of our No. 454
Vernier Height Gage

Toolmakers' Buttons

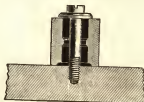
No. 494

For Jig and Die Work

Patented

These buttons are hardened, ground and lapped square with the end to diameter sizes of .300, .400, .500 and 1 inch to allow the mechanic easy figuring in laying out work. Each set contains four buttons of the same diameter. In A, B and C sets, three buttons are $\frac{1}{2}$ inch long and one button $\frac{3}{4}$ inch long. In set D, three buttons are 1 inch long and one button $1\frac{1}{4}$ inches long. The reason for the one longer button is to facilitate truing up when two buttons are positioned very close together. Any hole or series of holes where positive accuracy must be had in relation to each other, or from given points as in drill jigs, die and fixture work, toolmakers' buttons should be used. These buttons are nearly always used with a vernier height gage, altho in many cases micrometers and size blocks may be used. In using these buttons the work to which they are clamped should be true, for if not the buttons will slant parallel with the base and cause error in measurements. Once the work has been ground or planed true any hole or series of holes to be bored should be laid out with scriber, scale and dividers, which can be done within approximately .010 inch, prick punch lines intersecting at points to be bored, drill and tap sufficient depth, so that the .125-40 pitch screw shall enable the button to be clamped tight. File the hurr caused by tapping and screw the buttons to work just hard enough so that they may be tapped to position while locating. (See sectional view of button showing ample space around screw for adjustment.) The work should now be placed on a surface plate or machine platen for final adjustment of buttons with the height gage. When in position for accurate boring tighten clamping screws so that they will not move while being trued up and bored. Next clamp to face plate and tap the work to bring buttons to run true with their axis by using a test indicator. See that the work is fast to face plate, being careful that the buttons have not moved while clamping in position, then remove button, drill and bore. These buttons are furnished in sets of four and are screwed to the base plate or holder by the same screws and washers used in clamping to working points, permitting them to be placed compactly in the tool chest.

Sectional view of button applied.



PRICES

Set of four buttons with screws and washers.

No. 494 A	Set .300 x $\frac{1}{2}$ inch	.....	\$3.50
No. 494 B	Set .400 x $\frac{1}{2}$ "	.....	3.50
No. 494 C	Set .500 x $\frac{1}{2}$ "	.....	3.50
No. 494 D	Set 1.000 x 1 "	.....	8.00
Taps (.125-40) to use with A, B, and C sets, each		.....	.35
Taps (.250-24) to use with D set, each		.....	.45

A, B and C sizes packed 1 set in a box, 3 boxes in a carton.

D size packed 1 set in a box.

Universal Test Indicators No. 64



This indicator may be used to test inside, outside or surface work. It can be instantly attached to the spindle or the scriber of any surface gage, and used to show the slightest variation in thousandths. It may be clamped to a flat or round support, up to $\frac{3}{4}$ inch flat or round. A holder, as shown in cut, is designed to go in the tool-post of a lathe, adapting it for use to show the accuracy of all sorts of lathe work turning, chucking, or locating and centering work on face plate. It is particularly adapted to truing up tool-makers buttons as it can be moved with the carriage of a lathe testing the button its full length. The head of the needle has three working points, equally distant from its fulcrum, so that the needle will vibrate, reading in thousandths, when work is in contact with either point—in front, above or below it. When in front, the spring operating the needle needs to be reversed to throw the point of the needle up instead of down as when used above or below the work. This may be instantly done by a slight turn of the knurled disc to which the vibrating spring is attached. The working parts of the head are hardened. In setting the indicator, bring the contact point against the work so that the needle will point to 0, when any variation either way will show. The scale is graduated to read .015 inches on each side of 0.



As applied to Surface Gage

PRICES

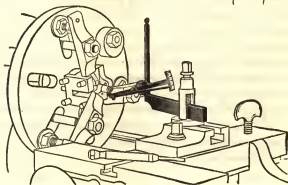
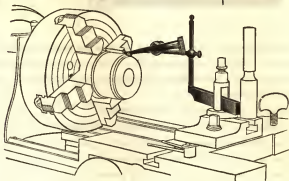
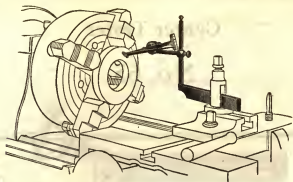
No. 64 A	Indicator, with Tool-Post Holder and Arm complete.....	\$4.25
No. 64 B	Indicator only.....	3.00
No. 64 C	Tool-Post Holder only, $\frac{3}{4}$ " x $\frac{3}{4}$ " x 6" (with upright spindle)....	.90
No. 64 D	" " " (with arm).....	1.25
No. 64 A sent unless otherwise ordered.		

No. 64 M

Metric

The same as above, except that it is graduated to show variations of $\frac{1}{1000}$ th of a millimeter. Prices as above.

Above numbers packed 1 in a box



Showing a Few Applications of Our No. 64 Indicator

Center Tester

No. 65



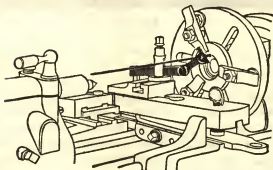
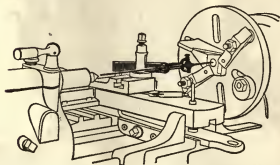
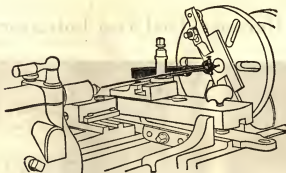
This instrument was designed to use in adjusting and locating centrally any point or hole in a piece of work operated upon in a lathe chuck or on a face-plate; also to test the truth of lathe centers or a shaft between the centers, the instrument being held in the tool posts.

This tester is of improved design and well finished.

The indicating needle is $12\frac{1}{4}$ inches long when jointed together, magnifying greatly the slightest movement at the indicating point, and being in two sections it may be carried in the mechanic's kit conveniently. The needle also passes through the ball, having a split stem, forming a chuck for holding it, that it may be adjusted to any desired length. The ball is pivoted to form a universal joint but may be instantly converted into a single joint for vertical motion by merely tightening the knurled nut, adapting it for both inside and outside surface contact. A steel ball about .175 inch in diameter slips over the point of the needle for inside work. The instrument is joined to a tool-post shank by a flexible steel ribbon with sufficient spring to properly hold the needle in contact with the work. The steel ribbon may also be adjusted by loosening the knurled nut holding it to the shank. This is an added feature readily appreciated, as the point to be indicated often is greater than the adjustment attained on the cross rest of a lathe. It is a tool needed in every up-to-date tool room.

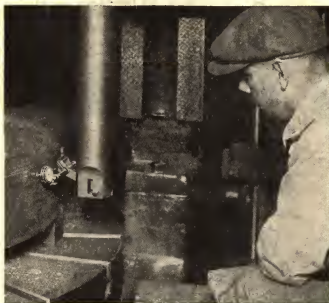
Price.....\$4.75

Packed 1 in a box.



Showing a Few Applications of Our No. 65 Center Tester

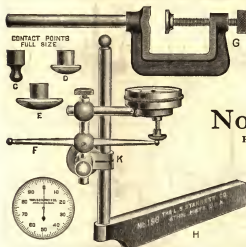
Universal Dial Test Indicator



No. 196

Simple, reliable, easily read and very sensitive, it may be adjusted to any angle. The slightest pressure upon contact point produces a movement of the hand on the dial. Circumference of the dial divided into 100 equal spaces, each representing a movement of the contact point of one-thousandth of an inch. One revolution of the hand therefore indicates one-tenth of an inch, the capacity of the instrument being two-tenths.

Universal Dial Test Indicator



No. 196

Patented

With the contact points D and E any exterior surface may be tested as in cutters, racks, etc. whereas the contact point C with its smaller radius and diameter should be

used only on plain surfaces. By bringing the contact point against the work with just enough pressure to give the hand one full turn, then setting it at 0, an opportunity is given for one full revolution of the hand to both right and left of 0, showing a rise or drop in the work and the amount of variation. A most valuable feature is the adjustable dial. By turning the knurled rim the dial may be instantly moved to bring the 0 mark to any point desired in relation to the hand. Each indicator is fitted with three hardened contact points for different classes of work. The special tool post holder and sleeve are useful in lathe work. For general work the indicator with sleeve K is adapted for use with our 9 inch or 12 inch surface gages, No. 57A and B, and No. 257 A and B, shown on pages 247 and 249. The clamp G permits attaching the indicator to large lathes and planer tools, milling arbors, etc. The attachment F more than doubles the value of the indicator adapting it for use inside of holes, to reach over blockings on face plates, etc.

PRICES

No. 196 A	Indicator with all attachments, as shown	\$13.50
No. 196 B	" " only, including 3 contact points C, D and E	9.00
No. 196 F	Hole attachment	1.80
No. 196 G	Clamp $1\frac{1}{4}$ " capacity, flat or round	.90
No. 196 H	Tool post holder, $\frac{5}{8}$ " x $\frac{3}{4}$ " x 6", with upright spindle	.90
No. 196 K	Sleeve complete with $\frac{5}{8}$ " hole for 9" surface gage spindle	.90
No. 196 L	Sleeve complete with $\frac{3}{4}$ " hole for 12" surface gage spindle	.90

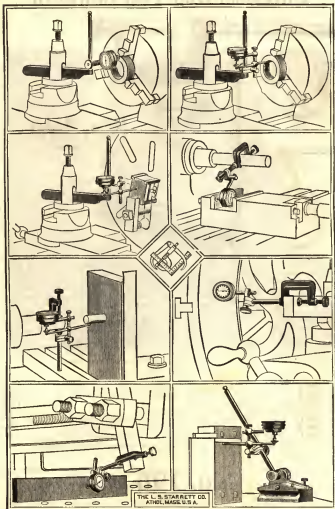
No. 196 A Indicator complete, sent unless otherwise ordered.

No. 196 M

Metric

The same as No. 196, except that it reads in $\frac{1}{100}$ mm. Prices same as for No. 196.

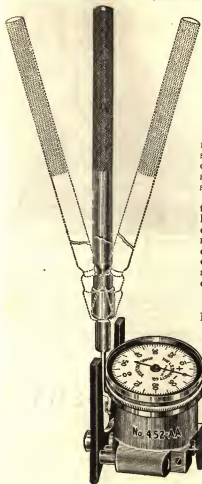
Above numbers packed 1 in a box.



A Few Applications of No. 196 Dial Test Indicator

Junior Cylinder Gage No. 452AA

PATENTED



Capacity $1\frac{7}{8}$ inches
to $2\frac{1}{2}$ inches

This gage was designed to readily show the wear or accuracy of engine cylinders before and after reconditioning where the minimum diameter is $1\frac{7}{8}$ inches, and the maximum $2\frac{1}{2}$ inches. It has the same mechanical trimness of our larger gages Nos. 452A and 452B and functions in a similar manner.

Has steel sled, combination rigid and toggle joint handle and our own patented double spring action. The regular adjustment of the dial in relation to the hand is employed and measurements are by thousandths with the dial marked plus and minus.

Weight 8 oz.

Price No. 452AA \$15.00

No. 452M-AA Metric

Capacity 48 mm. to
63 mm.

Same as No. 452AA except that it reads in $1/100$ mm.

Price No. 452M-AA
\$15.00

Packed 1 in a box.

Cylinder Gage No. 452 A

Patented

Mechanics in motor service, re-grind and re-bore shops pronounce this the ideal gage for determining tapered, out-of-round or scored cylinders. No more difficulty in convincing a car owner the necessity of truing up cylinders. Use the gage before him; it shows him instantly the condition of the cylinders to a one-thousandth part of an inch. After the variation of the bore has been determined note the reading on the dial and transfer to an outside micrometer to find the diameter. This gage is of rugged construction and has a non-breakable crystal over the dial. The dial is mounted on a block which moves at right

angles to the sled. The sled has two line contact points which are at all times in alignment with the walls of the cylinder. Two contact points (hardened) which independently cause the hand to travel over the dial reading in .001 and with a unique double spring action make the gage self-centering and absolutely non-collapsible. Provisions for diameters varying from $2\frac{1}{2}$ inches to 6 inches are made with two adjustable rods. These may be carried in the hollow handle of the gage. The dial is graduated to show plus or minus, one turn of the hand being .100. By turning the knurled rim the dial may be instantly moved to bring the 0 mark to any point desired in relation to the hand. Nickel plated. Wt. 12 ozs.



Showing in use No. 452 B with Toggle Handle.



Price No. 452 A.....\$15.00

No. 452 MA Metric

Same as above except that it reads in $\frac{1}{100}$ mm.

Price, No. 452 MA.....\$15.00

Improved Cylinder Gage No. 452 B

Patented

The new features in this gage—*Combination of Rigid or Toggle Handle—Locking Mechanism—Hardened and Ground Steel Sled.*

The *Combination Rigid and Toggle Joint Handle* erases any doubt among automobile service mechanics as to the universal application of this gage. The handle can be made rigid in a perpendicular or angular position or it may, by a slight turn of the handle, be

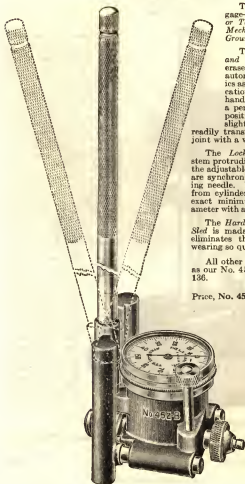
readily transformed to a universal joint with a wide sweep.

The *Locking Mechanism* (see stem protruding above dial) clamps the adjustable contact points which are synchronized with the indicating needle. Lock before removing from cylinder and measure for the exact minimum or maximum diameter with a micrometer.

The *Hardened and Ground Steel Sled* is made from a forging and eliminates the true line contacts wearing so quickly.

All other features are the same as our No. 452A described on page 136.

Price, No. 452B \$17.50



No. 452MB Metric

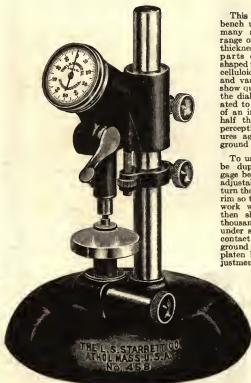
Same as above except that it reads in $\frac{1}{100}$ mm.

Price \$17.50

Dial Bench Gage

No. 458

Patented



This gage was designed for bench use and has, with its many adjustments, a wide range of usefulness. Widths, thicknesses, etc. of duplicate parts of practically any shaped piece of metal, veneer, celluloid, paper, cardboard and various kinds of fabrics show quickly and directly on the dial. The dial is graduated to read by thousandths of an inch but variations of half thousandths are easily perceptible. With black figures against a white background it is easy to read.

To use: Place the piece to be duplicated or standard gage between the platen and adjustable contact point and turn the dial with the knurled rim so the hand is at 0. The work will, when gaging it, then show the number of thousandths it is over or under size. The platen and contact points are hardened, ground and lapped. The platen has about 1 inch adjustment; the complete head about $2\frac{1}{2}$ inches. There is also a finer adjustment of the head of about $\frac{1}{4}$ inch. With these adjustments and the movement of the dial contact point of easily $\frac{1}{2}$ inch, any reading by thousandths of an inch within its capacity, $2\frac{1}{4}$ inches, can be obtained.

Iron parts have black enamel finish, other parts bright.

The base is $5\frac{1}{4}$ inches diameter. The height of the gage set for maximum capacity is about 9 inches. Weight of gage 6 lbs.

Price, with 3 contact points.....\$35.00

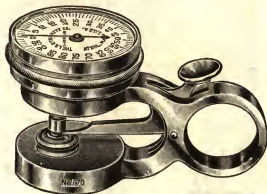
Sent in substantial wood case.

Dial Sheet Gage

No. 170

Patented

Capacity 0 to .150, by thousandths. Nickel Plated



The above cut shows a gage which is easily held with one finger through the ring and the thumb on the button above. This gage was primarily designed to determine quickly and accurately the thickness of paper, and is also adapted to measure the thicknesses of steel, fibre, cloth, cardboard, celluloid, leather, etc.

Its operation is simple in the extreme: The movable contact point is raised by pressing the thumb down on the thumb-pad and inserting the piece to be measured, remove the thumb and the pressure of the spring holds the piece parallel with the contact points, registering on the dial the thickness in thousandths of an inch. By turning the knurled rim, the dial may be instantly moved to bring the hand to 0. The dial is figured 0, 5, 10, 15, etc., one revolution being 100 thousandths of one inch. The gage is about $1\frac{3}{8}$ inches high, $1\frac{1}{2}$ inches in diameter and 3 inches long. Weight, $4\frac{1}{2}$ ounces.

Note:—Can be furnished, when so ordered, with stiffer spring and smaller contact point for sheet metal.

Price.....\$15.00 With Leather Case.....\$17.00

Sent with case unless otherwise ordered.

Packed 1 in a box.

Vernier Depth Gage

No. 448

This gage is invaluable where accurate measurements are necessary, and appeals to the class of mechanics whose work requires close limits, such as gaging the depth of holes and recesses in jig, die and fixture work, etc. The head is $\frac{1}{4}$ inch thick and $2\frac{1}{4}$ inches long, and is hardened, ground and lapped. The six-inch blade permits measurements to be made $3\frac{1}{2}$ " or 88 mm. in depth and for the 12" blade $9\frac{1}{2}$ " or 238 mm. in depth.

Blades graduated on one edge only, which, by means of the Vernier, permit reading by thousandths of an inch.

PRICES

Gage with 6 in. Blade	\$14.50
" " 6 in. " with case	16.25
" " 6 in. and 12 in. Blades	22.30
" " 6 in. " 12 in. " with case	24.55

No. 448 M

Metric

Blades graduated on one edge only to read, by means of the Vernier, in $1/50$ mm. Prices same as for No. 448.

No. 448 M & E

Metric and English



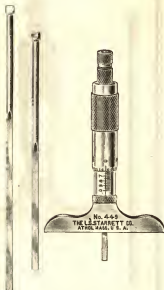
Graduated to read on one edge by means of the Vernier in $\frac{1}{50}$ mm. and on the other edge in thousandths of an inch. Price, the same as for No. 448.

Above numbers packed 1 in a box.

Micrometer Depth Gage No. 449

Patents Pending

Showing something different in depth gages. Now gives a mechanic the blade like rod instead of the round rod but with micrometer readings instead of the vernier. The blade turns under friction so it can be positioned at any angle relative to the base, but in actual use the same as a micrometer, the blade does not turn, moving perpendicularly only. The experienced mechanic knows what this means in bringing the contact point directly on to a very narrow shoulder.



The blades of the three rods, as shown, and to give a range from 0 to 3 inches, are about .040 thick and well under $\frac{1}{8}$ inch in width. The rods are inserted through a hole in the screw and seated by the knurled nut at the top. The base is hardened, ground and lapped.

PRICES

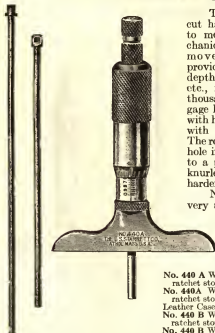
No. 449A with $2\frac{1}{2}$ " base, without ratchet stop.....	\$10.00
No. 449A with $2\frac{1}{2}$ " base, with ratchet stop.....	10.50
Leather Case for above.....	1.80
No. 449B with 4" base, without ratchet stop.....	12.50
No. 449B with 4" base, with ratchet stop.....	13.00
Leather Case for above.....	2.20

Sent with ratchet stop unless otherwise ordered

Packed 1 in a box.

Micrometer Depth Gages No. 440

With Three Measuring Rods



The gage shown in the cut has been added to our line to meet the demand of mechanics who prefer a 1-inch movement of the screw. It provides measurements of the depths of holes, projections, etc., from 0 to 3 inches by thousandths of an inch. Each gage has three measuring rods with hardened and lapped ends with means for adjustment. The rods are inserted through a hole in the screw and brought to a positive seat by a small knurled nut. The base is hardened, ground and lapped.

Note: The end of the rod is very slightly convex, but can be furnished flat, if so ordered, at the same price.

Furnished with or without Ratchet Stop.

PRICES

No. 440 A With 2½" base, without ratchet stop.....	\$9.00
No. 440 A With 2½" base, with ratchet stop.....	9.50
Leather Case for above.....	1.80
No. 440 B With 4" base, without ratchet stop.....	11.50
No. 440 B With 4" base, with ratchet stop.....	12.00
Leather Case for above.....	2.20

No. 440 M Metric

For Metric Measurements. These gages are of the same proportions as those of English measure, but have 25 mm. movement of the screw, and read by hundredths of a millimeter from 0 to 75 mm.

PRICES

No. 440 MA With 2½" base, without ratchet stop.....	\$9.00
No. 440 MA With 2½" base, with ratchet stop.....	9.50
Leather Case for above.....	1.80
No. 440 MB With 4" base, without ratchet stop.....	11.50
No. 440 MB With 4" base, with ratchet stop.....	12.00
Leather Case for above.....	2.20

Sent with ratchet unless otherwise ordered.

Above numbers packed 1 in a box.

Micrometer Depth Gages

No. 446



This gage is designed for measuring the depth of grooves, bores or irregular parts. It has $\frac{1}{2}$ inch movement of the screw, reading in thousandths; and with two $\frac{1}{4}$ inch and one 1 inch standard collars to slip off or on the Spindle, $2\frac{1}{4}$ inches, reading in thousandths, can be obtained. The split nut is covered and protected by our graduated sleeve which not only protects the nut from dirt, but provides a quick and accurate way of taking up wear and adjusting the micrometer to insure correct reading. The sleeve, being held by a stiff friction, may be rotated by a spanner wrench, accompanying each gage, so that the zero lines will coincide for correct reading. The bead is about $\frac{1}{10}$ inch thick; this and the point of measuring rod are hardened, ground and lapped.

Note: The end of the rod is very slightly convex, but can be furnished flat, if so ordered, at the same price.

PRICES

No. 446A	With $2\frac{1}{4}$ inch base.	\$7.75	With case.	\$9.00
No. 446B	" 4 " " "	8.50	" " "	10.50

No. 446 M

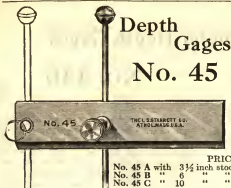
Metric

For Metric measurements. Has 13 mm. movement of screw, reading to one hundredth mm. Has two collars 12.5 mm. long and one collar 25 mm. long, making the range of the tool 63 mm. The bases are the same as in No. 446 A. approximately 57 mm., and B approximately 101 mm.

PRICES

No. 446 M-A	With $2\frac{1}{4}$ inch base.	\$7.75	With case.	\$9.00
No. 446 M-B	" 4 " " "	8.50	" " "	10.50

Above numbers packed 1 in a box.



Depth Gages No. 45

The wire in this gage is held to a groove by a friction spring inside the nut while adjusting, and may be used close to the end, as well as in the center of the straight edge or stock.

By loosening the nut, the gage may be neatly folded.

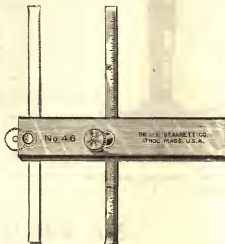
PRICES

No. 45 A with	3 1/2 inch stock and 3 1/2 inch wire	\$0.90
No. 45 B "	6 " " " 6 " "	1.40
No. 45 C "	10 " " " 6 " "	1.65

No. 46

Has in place of the round wire to slide in the groove, as shown with No. 45, a 4-inch or 6-inch scale, 1/4 inch wide, graduated in either 32ds and 64ths, or 64ths and 100ths, indicating exact measurements, and may be used separately from the gage. This tool, like our No. 45 can be used with the scale clamped close to the end, allowing depth measurements to be taken in difficult places.

Sent with 32ds-64ths graduations unless otherwise ordered.



PRICES

No. 46 A with 3 1/2 inch stock and 4 inch scale	\$1.50
No. 46 B with 3 1/2 inch stock and 6 inch scale	1.80
No. 46 C with 6 inch stock and 4 inch scale	1.80
No. 46 D with 6 inch stock and 6 inch scale	2.10
No. 46 E with 10 inch stock and 6 inch scale	2.70

No. 46M

Metric

The same as No. 46 except that the blades are graduated in millimeters on one side and in 1/4 millimeters on the other side.

Prices the same as for corresponding sizes of No. 46.

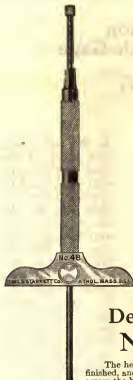
Above numbers packed 1 in a box.

Spring Depth Gage No. 48

This depth gage is particularly adaptable when taking quick measurements, as the spring in the barrel automatically forces the rod downward. The clamp screw locks the rod in position. Its capacity is 3 inches.

This gage is made with a base about $\frac{1}{16}$ inch thick and $2\frac{1}{2}$ inches long. The rod is $\frac{1}{8}$ inch diameter. Both the base and contact end of the rod are hardened and ground.

Price..... \$4.00



Depth Gages No. 237

The head of this gage is steel, nicely finished, and case-hardened, 2 inches wide across the base, $\frac{1}{8}$ inch thick.

The blade which is conveniently held in the groove of the head by a knurled lock nut, is a 6-inch narrow spring-tempered rule, the same as furnished with our No. 46 Depth Gage and can be used separately from the gage. Blades graduated in 32ds and 64ths of an inch will be sent unless otherwise ordered, but we can also supply them graduated in 64ths and 100ths.

Price..... \$1.50

No. 237 M Metric

The same as No. 237, except that the blade is 15 cm. long, graduated on one side in millimeters, and on the other in $\frac{1}{4}$ millimeters.

Price..... \$1.50

Above numbers packed 1 in a box.

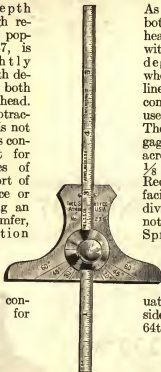


Combination Depth and Angle Gage

No. 236

Patented

This new depth gage, although resembling our popular No. 237, is made slightly larger and with degree lines on both sides of the head. Extreme protractor accuracy is not claimed in this construction but for certain classes of work, as a sort of ready reference or for duplicating an angle or chamfer, in combination with a desirable form of depth gage, it is a convenient tool for measuring.



As the cut shows, both sides of the head are marked with 30, 45 and 60 degree lines, so when set to the line on the turret, convenience to the user is doubled. The head of this gage is $2\frac{5}{8}$ inches across the base and $\frac{1}{8}$ inch thick. Recess in base to facilitate setting to divisions on rule not shown in cut. Spring tempered

rule used is $\frac{3}{16}$ in. wide and 6 inches long. Grad-

uated 32nds one side: other side 64ths.

Price.....\$2.25

Packed 1 in a box.

Combination Depth Gage and Hook Rule No. 236 H



So that mechanics may have the combination like the illustration, we have designed a special hook rule, applicable to our Nos. 236, 237, 46 and 493 depth gages. Hook adjusts parallel to the base for calipering and the rule can be used independently as a regular hook rule. Reverse hook and use as a depth gage. Rule is graduated 64ths and 32nds. The rod is 5-64 inch diameter and 6 inches long. Used for measuring in small holes where the rule will not enter. **Rod feature on No. 236 only.**

PRICES

No. 236 HA	Depth Gage with Hook Rule	\$2.75
No. 236 HB	" " " " " and with rod	2.95
No. 236 HC	Hook Rule only for Nos. 236, 237, 46 and 493	1.50
No. 236 HD	Rod only . . . . .	.20

No. 236HB Complete as shown, sent unless otherwise ordered.

Starrett Micrometer Calipers

The limit of accuracy obtained by measuring between contacts depends on the graduations on the instrument. It is evident that as the fineness of the graduation increases, the chances for mistaking one graduation for another also increase, so that some other method of determining extremely accurate measurements must be devised.

The common instrument for making such measurements is known as a micrometer caliper. It combines the double contact of the slide calipers with a screw adjustment which may be read with great accuracy.

Our calipers have a more exact and easier way of adjustment than by the old method of a movable anvil. This is obtained by placing over the barrel a thin, graduated sleeve, which carries the base or zero line, instead of having this line marked on the barrel itself. This sleeve may be turned by means of a small spanner wrench to bring the zero line correct to compensate for wear. The thin sleeve also keeps dirt from the screw. A knurled locking nut contracting a split flange around the spindle tightens and keeps the spindle central and true, or by a slight turn locks it firm, making a solid gage when desired. The anvil and spindle are hardened, ground and lapped.

Through years of experience in manufacturing micrometer calipers, which is perhaps the most discussed of all mechanical tools, we are able to meet the demands of the most critical mechanics. Among the many Starrett features are the lock nut, which by a slight turn locks the spindle firmly; the ratchet, permitting the same degree of pressure at points of contact in measuring; the decimal equivalents of 8ths, 16ths, 32ds and 64ths, on the frame, or on the thimble; the quick adjusting micrometer, reducing the time in reading from 1 inch to 0 or forty complete turns of the screw to an instant; the concave cut in the frame back of the anvil for insertion where the ordinary style will not go, the attachment for our 2 inch micrometers permitting measurements from 0 to 2 inches; and many others meeting all possible demands of a micrometer. Cuts and descriptions of our line will be found on the following pages.

This illustration shows a skeleton view of the interior mechanism of the Starrett micrometer.



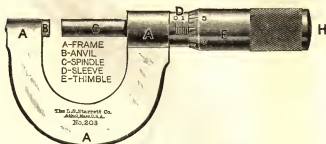
Ratchet Stop for Micrometer Calipers



In using this device, the ratchet slips by the pawl when more than a certain amount of pressure is applied, and so prevents the spindle from turning further and perhaps springing the instrument.

It is valuable where a number of measurements have to be taken quickly, and especially where measurements are taken by more than one person with the same caliper, as by its use the same amount of pressure is applied in each case to the objects measured.

How to Read a Micrometer Caliper



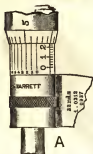
The spindle C is attached to the thimble E, on the inside, at the point H. The part of the spindle which is concealed within the sleeve and thimble is threaded to fit a nut in the frame A. The frame being held stationary, the thimble E is revolved by the thumb and finger, and the spindle C being attached to the thimble revolves with it, and moves through the nut in the frame, approaching or receding from the anvil B. The article to be measured is placed between the anvil B and the spindle C. The measurement of the opening between the anvil and the spindle is shown by the lines and figures on the sleeve D and the thimble E.

The pitch of the screw threads on the concealed part of the spindle is 40 to an inch. One complete revolution of the spindle therefore moves it longitudinally one fortieth (or twenty-five thousandths) of an inch. The sleeve D is marked with 40 lines to the inch, corresponding to the number of threads on the spindle. When the caliper is closed, the beveled edge of the thimble coincides with the line marked 0 on the sleeve, and the 0 line on the thimble agrees with the horizontal line on the sleeve. Open the caliper by revolving the thimble one full revolution, or until the 0 line on the thimble again coincides with the horizontal line on the sleeve; the distance between the anvil B and the spindle C is then $\frac{1}{40}$ or (.025) of an inch, and the beveled edge of the thimble will coincide with the second vertical line on the sleeve. Each vertical line on the sleeve indicates a distance of $\frac{1}{40}$ of an inch. Every fourth line is made longer than the others, and is numbered 0, 1, 2, 3, etc. Each numbered line indicates a distance of four times $\frac{1}{40}$ of an inch, or one-tenth.

The beveled edge of the thimble is marked in twenty-five divisions, and every fifth line is numbered, from 0 to 25. Rotating the thimble from one of these marks to the next moves the spindle longitudinally $\frac{1}{200}$ of twenty-five thousandths or one thousandth of an inch. Rotating it two divisions indicates two thousandths, etc. Twenty-five divisions will indicate a complete revolution, .025 or $\frac{1}{40}$ of an inch.

To read the caliper, therefore, multiply the number of vertical divisions visible on the sleeve by 25, and add the number of divisions on the bevel of the thimble, from 0 to the line which coincides with the horizontal line on the sleeve. For example, as the tool is represented in the engraving, there are seven divisions visible on the sleeve. Multiply this number by 25, and add the number of divisions shown on the bevel of the thimble, 3. The micrometer is open one hundred and seventy-eight thousandths. ($7 \times 25 = 175 + 3 = 178$.)

How to Read a Ten-Thousandths Micrometer Caliper



B



C

Readings in ten thousandths of an inch are obtained by the use of a Vernier, so named from Pierre Vernier, who invented the device in 1631. As applied to a caliper this consists of ten divisions on the adjustable sleeve, which occupy the same space as nine divisions on the thimble. The difference between the width of one of the ten spaces on the sleeve and one of the nine spaces on the thimble is therefore one-tenth of a space on the thimble. In engraving B the third line from 0 on thimble coincides with the first line on the sleeve. The next two lines on thimble and sleeve do not coincide by one-tenth of a space on thimble; the next two, marked 5 and 2, are two-tenths apart, and so on. In opening the tool, by turning the thimble to the left, each space on the thimble represents an opening of one-thousandth of an inch. If, therefore, the thimble be turned so that the lines marked 5 and 2 coincide, the caliper will be opened two-tenths of one-thousandth or two ten-thousandths. Turning the thimble further, until the line 10 coincides with the line 7 on the sleeve as in engraving C, the caliper has been opened seven ten-thousandths, and the reading of the tool is .2507.

To read a ten-thousandths caliper, first note the thousandths as in the ordinary caliper, then observe the line on the sleeve which coincides with a line on the thimble. If it is the second line, marked 1, add one ten-thousandth; if the third marked 2, add two ten-thousandths, etc.

Directions for Adjusting

These calipers will read correctly if there is no dirt between the anvil and spindle.

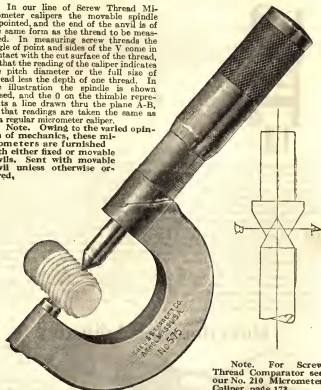
When it becomes necessary to readjust the tool to compensate for the wear of screw and nut, this is done, not by the anvil, but by means of our friction sleeve, as follows: Take up the wear of screw and nut, then remove all dirt from face of the anvil and spindle and bring them together carefully. Insert the small spanner wrench in the small hole and turn until the line on the sleeve coincides with the zero line on the thimble.



Screw Thread Micrometer Calipers No. 575 and No. 585

In our line of Screw Thread Micrometer calipers the movable spindle is pointed, and the end of the anvil is of the same form as the thread to be measured. In measuring screw threads the angle of point and sides of the V come in contact with the cut surface of the thread, so that the reading of the caliper indicates the pitch diameter or the full size of thread less the depth of one thread. In the illustration the spindle is shown closed, and the 0 on the thimble represents a line drawn thru the plane A-B, so that readings are taken the same as in a regular micrometer caliper.

Note. Owing to the varied opinion of mechanics, these micrometers are furnished with either fixed or movable anvils. Sent with movable anvil unless otherwise ordered.



Note. For Screw Thread Comparator see our No. 210 Micrometer Caliper, page 173.

PRICES

	Capacity		Range	Form of Thread	Price
No. 575 A	1 in.	8	to 13 threads	V & U. S. or Whit. Std.	\$12.00
No. 575 B	1 "	14	" 20 "	V & U. S. or Whit. Std.	12.00
No. 575 C	1 "	22	" 30 "	V & U. S. or Whit. Std.	12.00
No. 575 D	1 "	32	" 40 "	V & U. S. or Whit. Std.	12.00
No. 585 A	2 "	4½	" 7 "	V & U. S. or Whit. Std.	14.50
No. 585 B	2 "	8	" 13 "	V & U. S. or Whit. Std.	14.50
No. 585 C	2 "	14	" 20 "	V & U. S. or Whit. Std.	14.50
No. 585 D	2 "	22	" 30 "	V & U. S. or Whit. Std.	14.50

We can furnish these calipers in corresponding Metric sizes.

We include a 1 inch standard with each 2 inch caliper without extra charge.

Other sizes quoted upon application. Packed 1 in a box.

Screw Thread Micrometer Calipers

Caliper Reading or Pitch Diameter for V Threads—D— $\frac{.866}{N}$
"V" THREADS

Diam.	Threads per Inch	Caliper Reading or Pitch Diam.		Diam. *	Threads per Inch	Caliper Reading or Pitch Diam.	
D	N	D— $\frac{.866}{N}$	$\frac{.866}{N}$	D	N	D— $\frac{.866}{N}$	$\frac{.866}{N}$
		N	N			N	N
	64		.0135	$\frac{1}{8}$ "	24	.2139	.0361
	62		.0140	$\frac{1}{4}$	20	.2067	.0433
	60		.0144	$\frac{5}{16}$	20	.2692	.0433
	58		.0149	$\frac{3}{8}$	18	.2644	.0481
	56		.0155	$\frac{7}{16}$	18	.3269	.0481
	54		.0160	$\frac{1}{2}$	16	.3209	.0541
	52		.0167	$\frac{5}{8}$	16	.3834	.0541
	50		.0173	$\frac{3}{4}$	14	.3756	.0619
	48		.0180	$\frac{7}{8}$	14	.4381	.0619
	46		.0188	$\frac{1}{2}$	13	.4334	.0666
	44		.0197	$\frac{1}{2}$	12	.4278	.0722
	42		.0206	$\frac{1}{2}$	14	.5006	.0619
	40		.0217	$\frac{1}{2}$	12	.4903	.0722
	38		.0228	$\frac{1}{2}$	11	.5463	.0787
	36		.0241	$\frac{1}{2}$	10	.5384	.0866
	34		.0255	$\frac{1}{2}$	10	.6009	.0866
	32		.0271	$\frac{1}{2}$	10	.6634	.0866
	30		.0289	$\frac{1}{2}$	9	.7788	.0962
	28		.0309	1	8	.8918	.1082
	26		.0333	$1\frac{1}{8}$	8	1.0168	.1082
				$1\frac{1}{4}$	7	1.1263	.1237
				$1\frac{1}{2}$	6	1.3557	.1443

Caliper Reading or Pitch Diameter for U. S. Threads—D— $\frac{.6495}{N}$
U. S. STANDARD THREADS

Diam.	Threads per Inch	Caliper Reading or Pitch Diam.		Diam. .	Threads per Inch	Caliper Reading or Pitch Diam.	
D	N	D— $\frac{.6495}{N}$	$\frac{.6495}{N}$	D	N	D— $\frac{.6495}{N}$	$\frac{.6495}{N}$
		N	N			N	N
	64		.0101	$\frac{1}{8}$ "	20	.2175	.0325
	62		.0105	$\frac{1}{4}$	18	.2764	.0361
	60		.0108	$\frac{3}{8}$	16	.3344	.0406
	58		.0112	$\frac{1}{2}$	14	.3911	.0464
	56		.0116	$\frac{5}{8}$	13	.4501	.0499
	54		.0120	$\frac{3}{4}$	12	.5084	.0541
	52		.0125	$\frac{7}{8}$	11	.5660	.0590
	50		.0130	1	10	.6851	.0649
	48		.0135	$1\frac{1}{8}$	9	.8029	.0721
	46		.0141	1	8	.9188	.0812
	44		.0148	$1\frac{1}{4}$	7	1.0322	.0928
	42		.0155	$1\frac{1}{2}$	7	1.1572	.0928
	40		.0162	$1\frac{3}{4}$	6	1.2668	.1082
	38		.0171	$1\frac{1}{2}$	6	1.3918	.1082
	36		.0180	$1\frac{3}{4}$	$5\frac{1}{2}$	1.5070	.1180
	34		.0191	$1\frac{3}{4}$	5	1.6201	.1299
	32		.0203	$1\frac{3}{4}$	5	1.7451	.1299
	30		.0217	2	$4\frac{1}{2}$	1.8557	.1443
	28		.0232	$2\frac{1}{4}$	4	2.3376	.1624
	26		.0250	3	$3\frac{1}{2}$	2.8145	.1855
	24		.0271	$3\frac{1}{2}$	$3\frac{1}{2}$	3.3002	.1998
	22		.0295	4	3	3.7835	.2165

As there is no standard of diameter for the finer pitches the columns for diameter and caliper reading, or pitch diameter, are left blank. The column on the right gives the number to be subtracted from the diameter to obtain the caliper reading, or pitch diameter.
*These figures give the outside diameter for screws with threads cut theoretically sharp. As it is not practical to make these threads sharp the outside diameter will measure less than the figures given, the pitch diameter remaining the same.

Screw Thread Micrometer Calipers

Caliper Reading or Pitch Diameter, Whitworth Threads = $D - \frac{.640}{N}$

Whitworth Standard Threads

Diameter	Threads per Inch	Caliper Reading or Pitch Diameter	
D	N	$D - \frac{.640}{N}$	$\frac{.640}{N}$
$\frac{1}{4}$	20	.2180	.0320
$\frac{5}{16}$	18	.2769	.0355
$\frac{3}{8}$	16	.3350	.0400
$\frac{7}{16}$	14	.3918	.0457
$\frac{1}{2}$	12	.4467	.0533
$\frac{5}{8}$	12	.5092	.0533
$\frac{3}{4}$	11	.5668	.0582
$\frac{7}{8}$	11	.6293	.0582
1	10	.6860	.0640
$1\frac{1}{8}$	10	.7485	.0640
$1\frac{1}{4}$	9	.8039	.0711
$1\frac{3}{8}$	9	.8664	.0711
$1\frac{1}{2}$	8	.9200	.0800
$1\frac{3}{4}$	7	1.0336	.0914
2	7	1.1586	.0914
$2\frac{1}{4}$	6	1.2684	.1066
$2\frac{1}{2}$	6	1.3934	.1066
$2\frac{3}{4}$	5	1.4970	.1280
3	5	1.6220	.1280
$3\frac{1}{4}$	$4\frac{1}{2}$	1.7328	.1422
$3\frac{1}{2}$	$4\frac{1}{2}$	1.8578	.1422
4	$4\frac{1}{2}$	1.9828	.1422

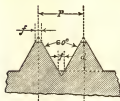
Caliper Reading or Pitch Diameter, A. S. M. E. Standard = $D - \frac{.6495}{N}$
Same form of thread as the U. S. Standard

A. S. M. E. Standard Threads

No.	Basic and Maximum Outside Diam.	Threads per Inch	Caliper Reading or Maximum Pitch Diameter	
	D	N	$D - \frac{.6495}{N}$	$\frac{.6495}{N}$
0	.060	80	.0519	.0081
1	.073	72	.0640	.0090
2	.086	64	.0759	.0101
3	.099	56	.0874	.0116
4	.112	48	.0985	.0135
5	.125	44	.1102	.0148
6	.138	40	.1218	.0162
7	.151	36	.1330	.0180
8	.164	36	.1460	.0180
9	.177	32	.1567	.0203
10	.190	30	.1684	.0217
12	.216	28	.1928	.0232
14	.242	24	.2149	.0271
16	.268	22	.2385	.0295
18	.294	20	.2615	.0325
20	.320	20	.2875	.0325
22	.346	18	.3099	.0361
24	.372	16	.3314	.0406
26	.398	16	.3574	.0406
28	.424	14	.3776	.0464
30	.450	14	.4036	.0464

Metric Screw Thread

(U. S. Form)



Formula

$$p = \text{pitch} = \frac{1}{\text{No. of threads per inch}}$$

$$d = \text{depth} = \text{pitch} \times .6495$$

$$f = \text{flat} = \frac{\text{pitch}}{8}$$

Table of most commonly used sizes

Size M/M	Pitch		Size M/M	Pitch	
	Intl. Std.	French Std.		Intl. Std.	French Std.
2	.45	.50	20	2.50	2.50
3	.55	.50	22	2.50	2.50
4	.70	.75	24	3.00	3.00
5	.85	.75	26	....	3.00
6	1.00	1.00	27	3.00	.. .
7	1.00	1.00	28	....	3.00
8	1.25	1.00	30	3.50	3.50
9	1.25	1.00	32	....	3.50
10	1.50	1.50	33	3.50	3.50
11	1.50	....	34	....	3.50
12	1.75	1.50	36	4.00	4.00
14	2.00	2.00	38	....	4.00
16	2.00	2.00	39	4.00	....
18	2.50	2.50	40	....	4.00

Quick Adjusting Micrometer Calipers No. 204



This micrometer caliper can be instantly opened or closed to any point within its capacity.

To operate the caliper it is only necessary to press with the finger against the end of the plunger. This immediately releases the nut, disengaging it from the screw, when any adjustment within an inch may be instantly made. Releasing the pressure, the nut instantly engages the screw, when fine adjustments may be made in the usual way.

This caliper also has our adjustable sleeve as described on a preceding page, as well as the lock nut and ratchet.

It will at once be recognized as a distinct advance in tools of this class; in fact it is in a class by itself.

For measurement by thousandths up to one inch.

Has ratchet stop and lock nut.

PRICES

No. 204 Range 0 to 1 inch	\$15.00
With Leather Case	16.25

No. 204 M

Metric

For measurement by hundredths of a millimeter up to twenty-five millimeters. Has ratchet stop and lock nut.

Prices same as for No. 204

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Hub Micrometer Caliper No. 228

This caliper is especially useful in the manufacture of cutters and such articles where exact hub lengths are required. The frame will easily pass through a $\frac{1}{4}$ inch hole. The caliper is made for measurement by thousandths up to one inch. Has lock nut and ratchet stop.

PRICES

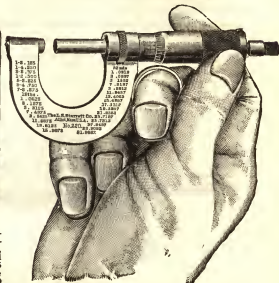
No. 228.....	\$10.00
With Leather case.....	11.25

No. 228 M

The same as No. 228, except that the caliper is for measurement by hundredths of a millimeter up to twenty-five millimeters.

Prices same as for No. 228

Micrometer Calipers with Finger Ring



PRICES

No. 220 For measurement by thousandths up to one inch, with lock nut and ratchet stop... \$11.25
With Leather case..... 12.50

No. 221 For measurement by thousandths up to one half inch, with lock nut and ratchet stop..... \$9.75

With Leather case..... 10.95

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Additional Features as applied to Micrometer Calipers

Micrometers

With all Thousandths Divisions Numbered



Some mechanics, also instructors in Trade Schools etc., fancy micrometers where the intermediate lines on the thimble denoting thousandths are numbered consecutively. Some think they tend for confusion. To satisfy all, however, we will furnish any micrometer, excluding our Nos. 238 and 239, with this feature *without extra charge*.

Micrometers

With Half Thousandths Divisions



We desire to call your attention to the half thousandths divisions on the thimble. May be had on any micrometer, excluding our Nos. 238 and 239, *without extra charge*.

Micrometer Calipers No. 3

Range 0 to 1 inch

For measurement by thousandths up to one inch.
Has lock nut and ratchet stop.

PRICES

No. 3.....	\$10.00
With Leather case.....	11.25

Note: This Micrometer can be furnished with lock nut at end of frame, when so ordered, at the same price. See cut of No. 226 on page 183.

No. 3 M

Metric—Range 0 to 25 mm.

For measurement by hundredths of a millimeter up to twenty-five millimeters. May be furnished when so desired, with lock nut on end of frame at regular list price of No. 3 M.

Has lock nut and ratchet stop.

PRICES

No. 3 M.....	\$10.00
With Leather case	11.25



No. 113

Ten Thousandths: Range 0 to 1 inch

Same as No. 3 except graduated for measurement by ten thousandths up to one inch.

Has lock nut and ratchet stop.

PRICES

No. 113.....	\$11.75
With Leather case.....	13.00

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

For Micrometers equivalent to our Nos. 3 and 113, only with cut out frame see our Nos. 230 and 231 on page 161.



"Sure!

My Mike'll get in there

It's a Starrett

230"

"See that cut away frame?
I'll get my Starrett into a lot
of places where you can't get
yours.

"An' my mike is accurate,
an' it *stays* accurate—for my
best work isn't worth a plugged
nickel if my mike isn't right."

The Starrett No. 230 Micrometer is proving exceedingly popular with machinists, not alone because of this added convenience, the cut away frame, but because it possesses all of the Starrett advantages, perfect "feel", enduring accuracy, lock nut and ratchet stop.

There is a Starrett micrometer for every machinist's need—backed by the Starrett reputation for extreme accuracy and long life.



Micrometer Calipers No. 230

Range 0 to 1 inch

For measurement by thousandths up to one inch. The frame is cut out for use in places where the ordinary frame cannot be inserted. The width of the anvil end of the frame is approximately $\frac{1}{8}$ inch. Has lock nut and ratchet stop.

PRICES

No. 230 \$10.00
With Leather case 11.25

No. 230M

Metric

Range 0 to 25 mm.

For measurement by hundredths of a millimeter up to twenty-five millimeters. Has lock nut and ratchet stop.

PRICES

No. 230 M \$10.00
With Leather case. . 11.25



No. 231

Ten Thousandths
Range 0 to 1 inch

Same as No. 230 except graduated for measurement by ten-thousandths up to one inch.

Has lock nut, ratchet stop and short anvil.

PRICES

No. 231 \$11.75
With Leather case 13.00

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Calipers

No. 203

Range 0 to 1 inch

For measurement by thousandths up to one inch.

Has neither lock nut nor ratchet stop.

PRICES

No. 203.....	\$8.50
No. 203C with cut-out frame.....	8.50
Either number in leather case.....	9.75

No. 203M

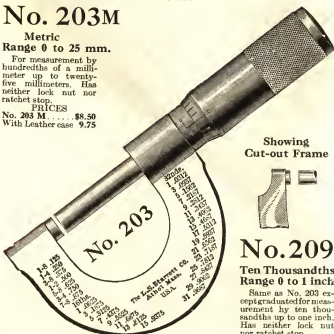
Metric

Range 0 to 25 mm.

For measurement by hundredths of a millimeter up to twenty-five millimeters. Has neither lock nut nor ratchet stop.

PRICES

No. 203 M.....	\$8.50
With Leather case.....	9.75



Showing
Cut-out Frame



No. 209

Ten Thousandths
Range 0 to 1 inch

Same as No. 203 except graduated for measurement by ten thousandths up to one inch. Has neither lock nut nor ratchet stop.

PRICES

No. 209.....	\$10.25
No. 209 C with cut-out frame.....	10.25
Either number in leather case.....	11.50

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Calipers

No. 201

Range 0 to 1 inch

For measurement by thousandths up to one inch.
Has lock nut but no ratchet stop.

PRICES

No. 201	\$ 9.50
No. 201C with cut-out frame	9.50
Either number in leather case . . .	10.75

No. 201 M

Metric

Range 0 to 25 mm.

For measurement by hundredths of a millimeter up to twenty-five millimeters.

Has lock nut but no ratchet stop.

PRICES

No. 201 M	\$ 9.50
With Leather case	10.75



Showing
Cut-Out Frame

No. 207

Ten Thousandths
Range 0 to 1 inches

Same as No. 201 except graduated for measurement by ten thousandths up to one inch.

Has lock nut but no ratchet stop.

PRICES

No. 207	\$11.25
No. 207 C with cut-out frame	11.25
Either number in leather case	12.50

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Calipers

No. 202

Range 0 to 1 inch

For measurement by thousandths up to one inch.

Has ratchet stop but no lock nut.

PRICES

No. 202.....	\$ 9.00
No. 202C with cut-out frame.....	9.00
Either number in leather case.....	10.25

No. 202M

Metric

Range 0 to 25 mm.

For measurement by hundredths of a millimeter up to twenty-five millimeters. Has ratchet stop, but no lock nut.

PRICES

No. 202 M.....	\$ 9.00
With leather case.....	10.25



Showing
Cut-out Frame



No. 208

Ten Thousandths
Range 0 to 1 inch

Same as No. 202 except graduated for measurement by ten thousandths up to one inch.

Has ratchet stop but no lock nut.

PRICES

No. 208.....	\$10.75
No. 208C with cut-out frame.....	10.75
Either number in leather case.....	12.00

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Ball Attachment No. 247

Fits Either Anvil or Spindle



Offers a clever little arrangement easily applied to certain micrometers for measuring tubing and other rounding surfaces. Fitting both, anvil and spindle, two of the attachments can be used at once. The ball is hardened and measures $\frac{1}{4}$ inch or .250 in diameter. It moves freely in the retainer, insuring contact with the anvil or spindle. It must be borne in mind, when using, the diameter of the ball must be subtracted from the actual micrometer reading.

Fits the following micrometers, Nos. 3, 113, 230, 231, 203, 209, 201, 207, 202, 208, 228, 2, 213, 217, 214, 212 attachment, 2A, 232 and 263.

Price No. 247, each \$0.50

Packed 12 in a box.

Micrometer Calipers No. 2

With Cut-Out Frame



Showing Cut-Out Frame

See following pages for listing of other 2 inch Micrometer Calipers

Micrometer Calipers No. 2

Range 1 to 2 inches

For measurement by thousandths from one inch to two inches, with lock nut, ratchet stop, and one inch test gage.

Note. This micrometer caliper furnished with lock nut at end of frame when so ordered. See cut of No. 226 on page 183.

We can also furnish this micrometer caliper with cut-out frame, when so ordered.

PRICES

No. 2.....	\$11.00
No. 2C with cut-out frame.....	11.00
Either number in leather case.....	12.60

No. 2M

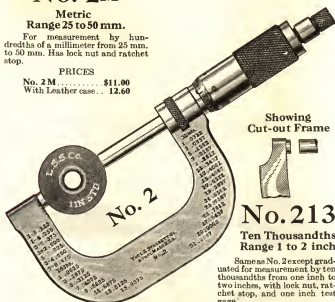
Metric

Range 25 to 50 mm.

For measurement by hundredths of a millimeter from 25 mm. to 50 mm. Has lock nut and ratchet stop.

PRICES

No. 2M.....	\$11.00
With Leather case.....	12.60



Showing
Cut-out Frame

No. 213

Ten Thousandths Range 1 to 2 inch

Same as No. 2 except graduated for measurement by ten thousandths from one inch to two inches, with lock nut, ratchet stop, and one inch test gage.

PRICES

No. 213.....	\$12.75
No. 213C with cut-out frame.....	12.75
Either number in leather case.....	14.35

Above numbers sent without case unless otherwise ordered.

No. 212 attachment (page 168) can be used with No. 2 Micrometer.

Packed 1 in a box.

Micrometer Calipers No. 217

Range 1 to 2 inches

For measurement by thousandths from one inch to two inches.

Has lock nut and one inch test gage, but no ratchet stop.

PRICES

No. 217 \$10.50
No. 217C with cut-out frame 10.50
Either number in Leather case... 12.10

No. 217M

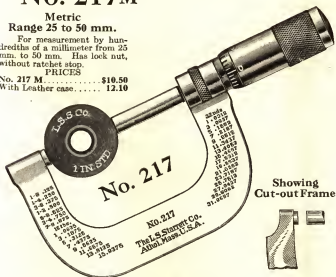
Metric

Range 25 to 50 mm.

For measurement by hundredths of a millimeter from 25 mm. to 50 mm. Has lock nut, without ratchet stop.

PRICES

No. 217 M \$10.50
With Leather case 12.10



Showing
Cut-out Frame



No. 214

Ten Thousandths

Range 1 to 2 inches

Same as No. 217, except graduated for measurement by ten thousandths from one inch to two inches. Has lock nut and one inch test gage, but no ratchet stop.

PRICES

No. 214 \$12.25
No. 214 C with cut-out frame 12.25
Either number in Leather case 13.85
Above numbers sent without case unless otherwise ordered.
No. 212 attachment can be used with No. 217 Micrometer.

Packed 1 in a box.

Attachment for Two Inch Micrometer Calipers No. 212



This attachment, by means of which a 2 inch micrometer may be converted into a 1 inch size, will be furnished, when ordered, with either our No. 2 or No. 217 two-inch Micrometers. It will not fit our No. 226 or No. 436 Micrometers.

Price.....\$3.00

No. 212 M

Metric

This attachment by means of which a 50 mm. micrometer may be converted into a 25 mm. size, will be furnished, when ordered, with either our No. 2 M or No. 217 M—50 mm. Micrometers. It will not fit No. 226 M or No. 436 M Micrometers.

Price.....\$3.00

Micrometer Calipers With Attachment

No. 2 A

Range 0 to 2 inches

This is our No. 2 micrometer, fitted with No. 212 attachment and 1 inch test gage.

PRICES

No. 2 A.....\$14.00
With Leather case..... 15.80

No. 2 M-A

Metric

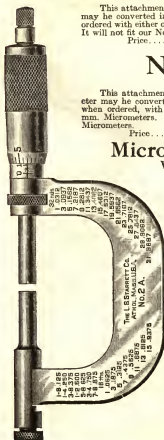
Range 0 to 50 mm.

This is our No. 2 M micrometer with No. 212 M attachment and 25 mm. test gage.

PRICES

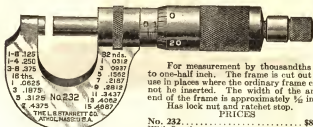
No. 2 M-A.....\$14.00
With Leather case..... 15.80

Sent without case unless
otherwise ordered.
Packed 1 in a box.



Micrometer Calipers

No. 232 Range 0 to $\frac{1}{2}$ inch



For measurement by thousandths up to one-half inch. The frame is cut out for use in places where the ordinary frame cannot be inserted. The width of the anvil end of the frame is approximately $\frac{1}{2}$ inch.

Has lock nut and ratchet stop.

PRICES

No. 232.....\$8.50
With Leather case..... 9.70

No. 233 Range 0 to $\frac{1}{2}$ inch

Ten Thousandths

Same as No. 232, except graduated for measurement by ten-thousandths up to one-half inch.

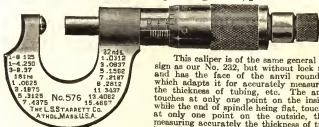
Has lock nut, ratchet stop and short anvil.

PRICES

No. 233.....\$10.25 With Leather case..... \$11.45

No. 576

For Measuring Tubing—Range 0 to $\frac{1}{2}$ inch



This caliper is of the same general design as our No. 232, but without lock nut and has the face of the anvil rounded, which adapts it for accurately measuring the thickness of tubing, etc. The anvil touches at only one point on the inside, while the end of spindle being flat, touches at only one point on the outside, thus measuring accurately the thickness of tubing. It will enter a $\frac{1}{4}$ inch hole freely.

For measurement by thousandths up to one-half inch with decimal equivalents stamped on the frame, with ratchet stop.

PRICES

No. 576.....\$8.50 With Leather case.....\$9.70
Without ratchet stop, 50 cents less.

No. 576 M

Metric—Range 0 to 13 mm.

The same as our No. 576, except that it is made for measurement by hundredths of a millimeter up to 13 millimeters.

Prices same as for No. 576

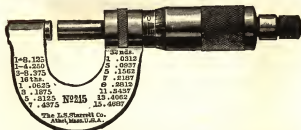
Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Calipers

No. 215

Range 0 to $\frac{1}{2}$ inch



For measurement by thousandths up to one-half inch.
Has lock nut and ratchet stop.

PRICES

No. 215.....\$8.50 With Leather case.....\$9.70

No. 215 M

Metric—Range 0 to 13 mm.

For measurement by hundredths of a millimeter up to 13 mm.
Has lock nut and ratchet stop.

PRICES

No. 215 M.....\$8.50 With Leather case.....\$9.70

No. 219

Ten Thousandths

Range 0 to $\frac{1}{2}$ inch

Same as No. 215, except graduated for measurement by ten thousandths up to one-half inch.

Has lock nut and ratchet stop.

PRICES

No. 219.....\$10.25 With Leather case.....\$11.45

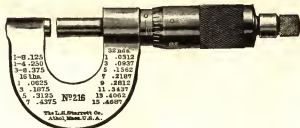
Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Micrometer Calipers

No. 216

Range 0 to $\frac{1}{2}$ inch



For measurement by thousandths up to one-half inch.
Has ratchet stop, but no lock nut.

PRICES

No. 216 \$7.50 With Leather case \$8.70

No. 216 M

Metric

Range 0 to 13 mm.

For measurement by hundredths of a millimeter up to 13 mm.
Has ratchet stop, without lock nut.

PRICES

No. 216 M \$7.50 With Leather case \$8.70

No. 218

Ten Thousandths

Range 0 to $\frac{1}{2}$ inch

Same as No. 216, except graduated for measurement by ten thousandths up to one-half inch.

Has ratchet stop, but no lock nut.

PRICES

No. 218 \$9.25 With Leather case \$10.45

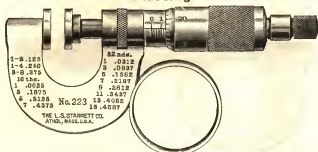
Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Paper Gage Micrometer Calipers

No. 223

With Ring



This caliper is used in measuring the thickness of paper, sheet rubber, cardboard, etc. The discs are placed on the anvil and spindle so that measurements can be taken without compressing the articles measured. Measures all sizes less than $\frac{1}{32}$ of an inch by thousandths of an inch.

PRICES

Without ratchet stop and with ring...	\$10.50	With case...	\$11.70
With " " " " " " " "	11.00	" " " " " " " "	12.20

No. 223 M

Metric

The same as above, except that it is graduated to read in hundredths of a millimeter.

Prices same as for No. 223

No. 225

The same as our No. 223, without the ring attachment.

PRICES

Without ratchet stop	\$ 9.50	With case...	\$10.70
With " " " " " " " "	10.00	" " " " " " " "	11.20

No. 225 M

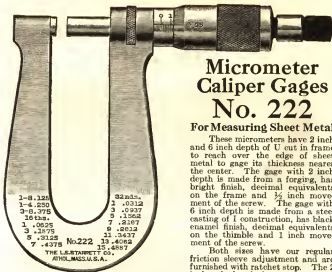
Metric

The same as our No. 225, except that it is graduated to read to hundredths of a millimeter.

Prices same as for No. 225

Above numbers sent with ratchet stop and without case unless otherwise ordered.

Packed 1 in a box.



Micrometer Caliper Gages No. 222

For Measuring Sheet Metal

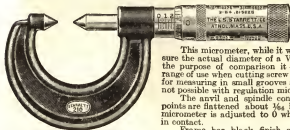
These micrometers have 2 inch and 6 inch depth of U cut in frame to reach over the edge of sheet metal to gage its thickness nearer the center. The gage with 2 inch depth is made from a forging, has bright finish, decimal equivalents on the frame and $\frac{1}{2}$ inch movement of the screw. The gage with 6 inch depth is made from a steel casting of 1 construction, has black enamel finish, decimal equivalents on the thimble and 1 inch movement of the screw.

Both sizes have our regular friction sleeve adjustment and are furnished with ratchet stop. The 2 inch only has lock nut.

PRICES

Depth in frame 2 inches.....	\$11.25
" " " 6 " 	14.50
Leather case for 2 inch depth only.....	2.50
No. 222 M Metric The same as No. 222 except that they are graduated for measurements by hundredths of a millimeter. Prices same as for No. 222.	

Micrometer Calipers No. 210 Screw Thread Comparator



This micrometer, while it will not measure the actual diameter of a V thread, for the purpose of comparison it has a wide range of use when cutting screw threads and for measuring in small grooves and recesses not possible with regulation micrometers.

The anvil and spindle conical contact points are flattened about $\frac{1}{64}$ inch and the micrometer is adjusted to 0 when flats are in contact.

Frame has black finish and thimble bears fractions and decimal equivalents.

PRICES

No. 210 A Range 0 to $\frac{1}{4}$ inch.....	\$7.00
No. 210 B Range 1 to $1\frac{1}{4}$ inch.....	8.00

Note: Larger sizes quoted on application. Metric measure by hundredths of a millimeter, furnished in corresponding sizes and prices as above. Above numbers packed 1 in a box.

Micrometer Caliper Stand No. 206



adapted to our 1 and

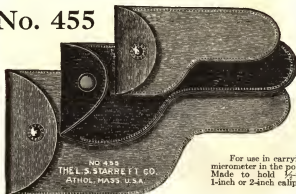
Where frequent reference is to be made to a caliper that is set at a given size, or where a number of pieces must be made of the same size, it is sometimes more convenient to bring the work to the micrometer than to bring the micrometer to the work. The use of a caliper also occupies one hand, while if the mechanic could use both hands he could work faster. To meet such conditions as these we offer the Starrett improved micrometer caliper stand. This consists of a solid base with a tilting bracket having a clamp which holds the caliper in any convenient position. A turn of the winged nut locks in place both the hinged bracket and the caliper. Both hands are then free for the work. This tool is nickel plated and is specially adapted to our 1 and 2-inch micrometers, excepting our No. 226 and No. 436 lines.

Price..... \$3.00

Packed 1 in a box.

Soft Leather Cases for Micrometer Calipers

No. 455



For use in carrying a micrometer in the pocket. Made to hold $\frac{1}{4}$ -inch, 1-inch or 2-inch calipers.

PRICES

$\frac{1}{4}$ inch size.....	each	\$0.50
1 " ".....	"	.50
2 " ".....	"	.50

Pocket Micrometer Case No. 911



Closed



Open

This case is much like the ordinary spectacle case, made of steel with snappy spring cover. It is plush lined and covered with Athol artificial leather.

It is light in weight, compact in size and aside from protection of the micrometer against dirt and grit when carried in the pocket, it is less cumbersome than other types.

For 1 inch micrometers only.

Price \$0.75

Packed 1 in a box.

Micrometer Caliper Heads

No. 263 Range 0 to 1 inch



The engraving is full size, length from shoulder to lock nut $\frac{3}{4}$ inch, diameter, $\frac{1}{2}$ inch. These heads are easily attached to tools or machines when fine measurements are required. They have ratchet stops and lock nuts and are graduated to read to thousandths of an inch. They will be furnished without ratchet or lock nut when so desired, at same price.

Price.....\$5.50

No. 263 M Metric, 25 Millimeters

The same as No. 263, except that it is graduated for measurement by hundredths of a millimeter up to twenty-five millimeters.

Price.....\$5.50

No. 363 Ten Thousandths

The same as No. 263, except that it is graduated for measurement by ten thousandths of an inch.

Price.....\$7.25

No. 463 Range 0 to $\frac{1}{2}$ inch



The engraving above shows the full size of our half inch micrometer head and is similar to our No. 263 except in size and range. The length of the clamping surface is $\frac{3}{4}$ inch, and the diameter $\frac{3}{4}$ inch. They are made without lock nut but will be furnished with or without ratchet stop. Sent with ratchet stop unless otherwise ordered.

Price.....\$4.50

No. 463 M Metric, 13 Millimeters

The same as No. 463 except that it is graduated for measurement by hundredths of a millimeter up to thirteen millimeters.

Price.....\$4.50

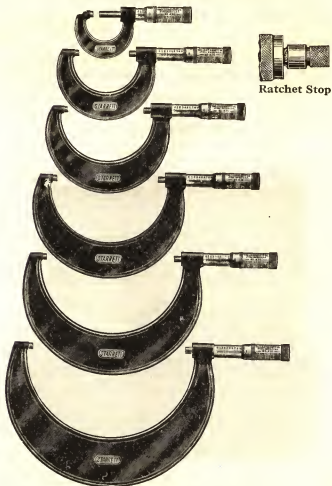
No. 464 Ten Thousandths

The same as our No. 463 except that it is graduated for measurement by ten thousandths of an inch.

Price.....\$6.25

Packed 1 in a box.

Black Enameled Frame Micrometer Calipers No. 436



For prices, see pages 180, 181 and 182.

When selecting Micrometers for the shop it is well to remember that Starrett offer enduring accuracy, greater utility, and the most for the money.

**SHOWING STYLE OF WOOD CASE IN WHICH WE
FURNISH OUR SETS OF MICROMETERS**

No. 436-E-F-G-H

AS DESCRIBED ON PAGE 181



Black Enameled Frame Micrometer Calipers No. 436 - No. 436 M

Range 0 to 1 inch

Range 0 to 25 mm

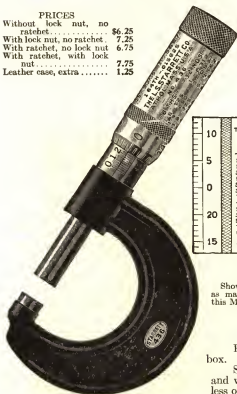
Furnished with or without Ratchet or Lock Nut

PRICES

Without lock nut, no ratchet.....	\$6.25
With lock nut, no ratchet.....	7.25
With ratchet, no lock nut.....	6.75
With ratchet, with lock nut.....	7.75
Leather case, extra.....	1.25



Ratchet Stop



	1-64 015625	
	THE L. S. STARRETT CO.	
	ATHOL, MASS., U.S.A.	
	NO. 436	
	-5 THS- -32 HDS-	
10	1-8 .125 1-03 12	
	1-4 .250 3-09 37	
5	3-6 .375 5-15 62	
	1-2 .500 7-21 67	
0	5-6 .625 9-26 12	
	3-4 .750 11-34 37	
	7-6 .875 13-40 62	
	-16 THS- 15-46 67	
20	1- .0625 17-53 12	
	3- .1075 19-59 37	
	5- .1525 21-65 62	
	7- .4375 23-71 67	
	9- .5625 25-76 12	
15	11- .6875 27-84 37	
	13- .8125 29-90 62	
	15- .9375 31-95 67	

Showing decimal equivalents as marked on the thimble of this Micrometer Caliper.

Packed one in wooden box.

Sent without ratchet and without lock nut unless otherwise ordered.

Note. This Micrometer Caliper also furnished to read in $\frac{1}{2}$ thousandths when so ordered.

The above cut shows the 1 inch size of our Micrometer Calipers, No. 436. See pages 180, 181 and 182 for other sizes and prices. This line made in sizes 1 inch to 12 inch inclusive.

Micrometer Calipers

No. 436 - No. 436M

Black Enameled Frame
Decimal Equivalents on the Thimble
Sizes and Prices

Size Inches	Size m/m	Range Inches	Range m/m	Without Ratchet no Lock nut	With Ratchet no Lock nut	With Lock nut no Ratchet	With Ratchet with Lock nut	Standards extra	Leather Case extra
1	25	0- 1	0- 25	\$6.25	\$6.75	\$7.25	\$7.75		\$1.25
2	50	1- 2	25- 50	7.00	7.50	8.00	8.50	1" \$1.00	2.50
3	75	2- 3	50- 75	7.75	8.25	8.75	9.25	2" 1.25	3.00
4	100	3- 4	75-100	8.50	9.00	9.50	10.00	3" 1.50	3.50
5	125	4- 5	100-125	9.25	9.75	10.25	10.75	4" 1.75	4.00
6	150	5- 6	125-150	10.00	10.50	11.00	11.50	5" 2.00	4.75
7	175	6- 7	150-175	11.00	11.50	12.00	12.50	6" 2.25	These Mi- crometers sizes 7" to 12" sent in finished wood case without extra charge.
8	200	7- 8	175-200	12.00	12.50	13.00	13.50	7" 2.50	
9	225	8- 9	200-225	13.00	13.50	14.00	14.50	8" 2.75	
10	250	9-10	225-250	14.00	14.50	15.00	15.50	9" 3.00	
11	275	10-11	250-275	15.00	15.50	16.00	16.50	10" 3.25	
12	300	11-12	275-300	16.00	16.50	17.00	17.50	11" 3.50	

Note: Micrometers listed above, sizes 1 inch to 6 inches, can be furnished to read to ten thousandths of an inch at an additional cost of \$1.75 each to above list prices.

Sent without ratchet and without lock nut and without standards unless otherwise ordered.

Micrometer Caliper Sets

No. 436

With Black Enameled Frame. Decimal Equivalents
on the Thimble.

PRICES PER SET		Without Lock nut	With Lock nut	Case Extra
No. 436A	Set of three micrometer calipers comprising 1, 2 and 3 inch sizes, all <i>without</i> ratchet stop.....	\$21.00	\$24.00	\$4.00
	Set of two standards for above.....	\$2.25		
No. 436B	Set of six micrometer calipers comprising 1, 2, 3, 4, 5 and 6 inch sizes, all <i>without</i> ratchet stop.....	48.75	54.75	7.50
	Set of five standards for above.....	\$7.50		
No. 436C	Set of three micrometer calipers comprising 1, 2 and 3 inch sizes, all <i>with</i> ratchet stop.....	22.50	25.50	4.00
	Set of two standards for above.....	\$2.25		
No. 436D	Set of six micrometer calipers comprising 1, 2, 3, 4, 5 and 6 inch sizes, all <i>with</i> ratchet stop.....	51.75	57.75	7.50
	Set of five standards for above.....	\$7.50		
Sets A, B, C and D are sent <i>without</i> case and <i>without</i> standards and without lock nut unless otherwise ordered.				
No. 436E	Set of six micrometer calipers, range 6 inches to 12 inches, comprising 7, 8, 9, 10, 11 and 12-inch sizes, all <i>without</i> ratchet stop and <i>without</i> standards, in finished wood case.....	\$87.00	\$93.00	
	Set of standards for above.....	\$17.25		
No. 436F	Same as Set E, except all <i>with</i> ratchet stop. Set of standards for above.....	90.00	96.00	
		\$17.25		
No. 436G	Set of twelve micrometer calipers, range 0 to 12 inches, comprising all sizes from 1 inch to 12 inch, inclusive, all <i>without</i> ratchet stop, and <i>without</i> standards, in finished wood case.....	139.25	151.25	
	Set of standards for above.....	\$24.75		
No. 436H	Same as Set G, except all <i>with</i> ratchet stop. Set of Standards for above.....	145.25	157.25	
		\$24.75		

Sets E, F, G, and H sent *without* standards and without lock nut unless otherwise ordered.

Sets E, F, G and H are all furnished in finished wood cases at prices shown above.

Micrometer Caliper Sets

No. 436 M

Metric Measure

With Black Enameled Frame

PRICES PER SET

		Without Lock nut	With Lock nut	Case Extra
No. 436MA	Set of three micrometer calipers comprising 25, 50 and 75 mm. sizes, all <i>without</i> ratchet stop.	\$21.00	\$24.00	\$4.00
	Set of two standards for above.	\$2.25		
No. 436MB	Set of six micrometer calipers comprising 25, 50, 75, 100, 125 and 150 mm. sizes, all <i>without</i> ratchet stop.	48.75	54.75	7.50
	Set of five standards for above.	\$7.50		
No. 436MC	Set of three micrometer calipers comprising 25, 50 and 75 mm. sizes, all <i>with</i> ratchet stop.	22.50	25.50	4.00
	Set of two standards for above.	\$2.25		
No. 436MD	Set of six micrometer calipers comprising 25, 50, 75, 100, 125 and 150 mm. sizes, all <i>with</i> ratchet stop.	51.75	57.75	7.50
	Set of five standards for above.	\$7.50		

Sets MA, MB, MC and MD are sent *without* case and *without* standards and without lock nut unless otherwise ordered.

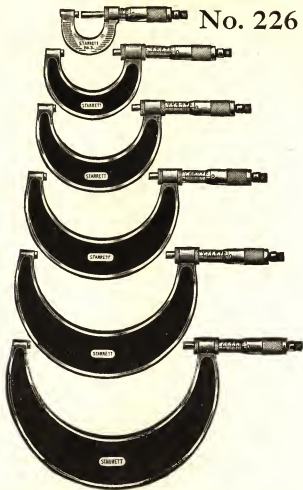
No. 436ME	Set of six micrometer calipers, range 150 mm. to 300 mm., comprising 175, 200, 225, 250, 275 and 300 millimeter sizes, all <i>without</i> ratchet stop and without standards, in finished wood case.	\$87.00	\$93.00	
	Set of standards for above.	\$17.25		
No. 436MF	Same as Set ME, except all <i>with</i> ratchet stop.	90.00	96.00	
	Set of standards for above.	\$17.25		
No. 436MG	Set of twelve micrometer calipers, range 0 to 300 mm., comprising all sizes from 25 mm. to 300 mm., inclusive, all <i>without</i> ratchet stop, and without standards, in finished wood case.	139.25	151.25	
	Set of standards for above.	\$24.75		
No. 436MH	Same as Set MG, except all <i>with</i> ratchet stop.	145.25	157.25	
	Set of standards for above.	\$24.75		

Sets ME, MF, MG and MH sent *without* standards and without lock nut unless otherwise ordered.

Sets ME, MF, MG and MH are all furnished in finished wood cases at prices shown above.

Micrometer Calipers

No. 226



For prices see pages 184 and 185

Micrometer Caliper Sets No. 226

PRICES PER SET

		Without case	With case
No. 226C	Set of three micrometer calipers comprising our No. 201 1-inch, No. 226 2-inch and 3-inch, all without ratchet stop.....	\$28.00	\$32.00
	Set of two standards for above.....		\$2.25
No. 226D	Set of three micrometer calipers comprising our No. 3 1-inch, No. 226 2-inch, and 3-inch, all with ratchet stop.....	29.50	33.50
	Set of two standards for above.....		\$2.25
No. 226G	Set of six micrometer calipers comprising our No. 201 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all without ratchet stop.....	63.75	71.25
	Set of five standards for above.....		\$7.50
No. 226H	Set of six micrometer calipers comprising our No. 3 1-inch, No. 226 2-inch, 3-inch, 4-inch, 5-inch, and 6-inch, all with ratchet stop.....	66.75	74.25
	Set of five standards for above.....		\$7.50
No. 226K	Set of four micrometer calipers reading to ten thousandths, comprising our No. 207 1-inch, with decimal equivalents, No. 226 2-inch, 3-inch, and 4-inch, all with lock nut and without ratchet stop.....	45.75	51.75
	Set of three standards for above.....		\$3.75
No. 226L	Set of four micrometer calipers reading to ten thousandths, comprising our No. 113 1-inch, with decimal equivalents, No. 226 2-inch, 3-inch, and 4-inch, all with lock nut and with ratchet stop.....	47.75	53.75
	Set of three standards for above.....		\$3.75

No. 226 M

Metric

PRICES PER SET

		Without case	With case
No. 226M-C	Set of three micrometer calipers comprising our No. 201 M, 25 mm.; No. 226 M, 50 mm., and 75 mm., all without ratchet stop.....	\$28.00	\$32.00
	Set of two standards for above.....		\$2.25
No. 226M-D	Set of three micrometer calipers comprising our No. 3 M, 25 mm.; No. 226 M, 50 mm., and 75 mm., all with ratchet stop.....	29.50	33.50
	Set of two standards for above.....		\$2.25
No. 226M-G	Set of six micrometer calipers comprising our No. 201 M, 25 mm.; No. 226 M, 50 mm.; 75 mm.; 100 mm.; 125 mm., and 150 mm., all without ratchet stop.....	63.75	71.25
	Set of five standards for above.....		\$7.50
No. 226M-H	Set of six micrometer calipers comprising our No. 3 M, 25 mm.; No. 226 M, 50 mm.; 75 mm.; 100 mm.; 125 mm.; and 150 mm., all with ratchet stop.....	66.75	74.25
	Set of five standards for above.....		\$7.50

The above sets are sent without case, and without standards unless otherwise ordered.

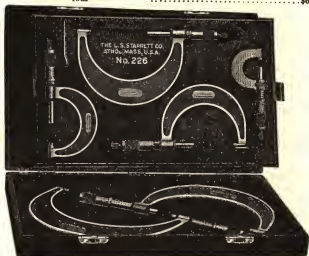
See page 186 for illustrations of cases.



**Cases
for
Microm-
eter
Calipers
Nos.
226,
226M,
436
and
436M**

The cases for these calipers are well made and nicely finished. They are covered with leather and lined with velvet.

Case only, for set of three Micrometers.....	\$4.00
" " " " " four "	\$6.00



Case only, for set of six Micrometers.....\$7.50
NOTE: All cases are made to hold the standards.

Heavy Micrometer Calipers No. 238

Range 0 to 1 inch

These calipers are made with the frame and the other parts much heavier than the regular one inch micrometers and will last longer under hard usage, on account of their stiffness and because of larger bearing surface for the threads. They are especially useful on grinding work and wherever it is necessary to take measurements after the lock nut is set. Many mechanics prefer this micrometer for lathe and milling machine work where constant measurements are required under trying conditions and in the grinding room where dirt and moisture are found.

To prevent wear the measuring surfaces and bearing parts are hardened. These calipers have the decimal equivalents stamped on the frame and are packed in a strong wooden box.

For measurement by thousandths up to one inch. Has ratchet stop and lock nut.

Price.....\$12.00
With Leather case.....14.25

No. 238 M

Metric

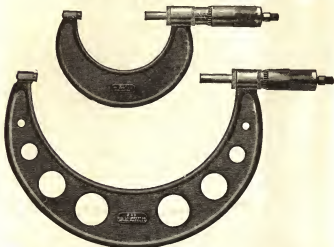
Range 0 to
25 mm.

The same as above except that they are made for measurement by hundredths of a millimeter up to twenty-five millimeters.
Price..\$12.00

With
Leather
case . 14.25

No. 238 and No. 238-M sent without case unless otherwise ordered.
Packed 1 in a box.

Heavy Micrometer Calipers No. 239



These calipers were designed to meet the exacting demands of heavy and severe usage. The spindle and screw portion is of larger area than in the regular micrometer, thus insuring longer wear and greater rigidity; those from two inch to six inch, inclusive, are made from drop forgings and the larger sizes, from seven inch to twelve inch, from steel castings with holes in frame as shown by larger cut. The bearing parts and measuring surfaces are hardened to prevent wear, and the same means provided for adjustment as in our other micrometers. Made with lock nut and ratchet stop. Sizes are stamped on these tools to show their capacity.

PRICES

1 inch to 2 inches, \$13.25	.....	With standard, \$14.75
Leather case extra	.....	\$2.50
2 inches to 3 inches, \$14.50	.....	With standard, \$16.00
Leather case extra	.....	\$3.00
3 inches to 4 inches, \$16.00	.....	With standard, \$17.75
Leather case extra	.....	\$3.50
4 inches to 5 inches, \$17.50	.....	With standard, \$19.50
Leather case extra	.....	\$4.00
5 inches to 6 inches, \$19.00	.....	With standard, \$21.25
Leather case extra	.....	\$4.75
6 inches to 7 inches, \$20.50	.....	With standard, \$23.50
7 " " 8 " 22.00	.....	" " 25.25
8 " " 9 " 23.50	.....	" " 27.25
9 " " 10 " 25.00	.....	" " 29.00
10 " " 11 " 26.50	.....	" " 30.75
11 " " 12 " 28.00	.....	" " 32.50

Leather cases not supplied for sizes above 6 inch. Micrometers sent without case, and with standard unless otherwise ordered. Sizes 2 inch to 6 inch sent in strong wood boxes. Larger sizes sent in finished wood cases.

Sets of Heavy Micrometer Calipers

Set No. 239A, consisting of our No. 238 one inch, as shown on page 187 with decimal equivalents on frame, and our No. 239 sizes 2 to 6 inch.

Sent in strong wood boxes.

Price, set, \$92.25 With standards, \$101.25

Sent with standards unless otherwise ordered.

Set No. 239B, consisting of our No. 238 one inch as shown on page 187 with decimal equivalents on frame, and sizes 2 to 12 inch of our No. 239.

Sent in strong wood boxes.

Price, set, \$237.75 With standards, \$269.50

Sent with standards unless otherwise ordered.

Heavy Micrometer Calipers No. 239 M

Metric

The same as our No. 239, except that they are graduated for measurement by hundredths of a millimeter.

PRICES

25 to 50 mm.,	\$13.25	.....	With standard,	\$14.75
	Leather case extra	.....		\$2.50
50 to 75 mm.,	\$14.50	.....	With standard,	\$16.00
	Leather case extra	.....		\$3.00
75 to 100 mm.,	\$16.00	.....	With standard,	\$17.75
	Leather case extra	.....		\$3.50
100 to 125 mm.,	\$17.50	.....	With standard,	\$19.50
	Leather case extra	.....		\$4.00
125 to 150 mm.,	\$19.00	.....	With standard,	\$21.25
	Leather case extra	.....		\$4.75
150 to 175 mm.,	\$20.50	.....	With standard,	\$23.50
175 " 200 "	22.00	.....	" "	25.25
200 " 225 "	23.50	.....	" "	27.25
225 " 250 "	25.00	.....	" "	29.00
250 " 275 "	26.50	.....	" "	30.75
275 " 300 "	28.00	.....	" "	32.50

Leather cases not supplied for sizes above 150 mm. Micrometers sent without case, and with standards unless otherwise ordered. Sizes 50 mm. to 150 mm. sent in strong wood boxes. Larger sizes sent in finished wood cases.

Sets of Heavy Micrometer Calipers

Metric

Set No. 239 MA, consisting of our No. 238 M as shown on page 187, 0 to 25 mm., and our No. 239 M sizes 25 to 150 mm.

Sent in strong wood boxes.

Price, set, \$92.25 With standards, \$101.25

Sent with standards unless otherwise ordered.

Set No. 239 MB, consisting of our No. 238 M, as shown on page 187, 0 to 25 mm., and sizes 25 to 300 mm., of our No. 239 M.

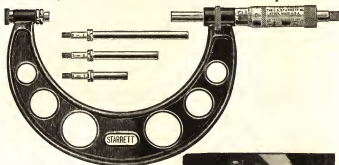
Sent in strong wood boxes.

Price, set, \$237.75 With standards, \$269.50

Sent with standards unless otherwise ordered.

Micrometer Caliper Sets No. 224

For Automobile and Aviation Service Shops



No. 224 AA

Range
0 to 4 inches

No. 224 A

Range
2 to 6 inches

One micrometer for all intermediate measurements from 0 to 4 inches or 2 inches to 6 inches by thousandths. Furnished with accurately positioned and readily interchangeable anvils. Measures pistons, crankshafts, cam shafts, and wrist pins.

The frames are made from forgings and have black enamel finish. Decimal equivalents are stamped on the thimbles and the micrometers are provided with lock nuts.

See page 191 for prices



Micrometer Caliper Sets

	No. 224AA English Range 0 to 4 inches	No. 224M AA Metric Range 0 to 100 mm.
Without ratchet stop and without standards	\$18.00	\$18.00
With ratchet stop and without standards	18.50	18.50
Without ratchet stop and with standards	21.75	21.75
With ratchet stop and with standards	22.25	22.25
	No. 224A English Range 2 to 6 inches	No. 224MA Metric Range 50 to 150 mm.
Without ratchet stop and without standards	\$20.00	\$20.00
With ratchet stop and without standards	20.50	20.50
Without ratchet stop and with standards	26.50	26.50
With ratchet stop and with standards	27.00	27.00

NOTE: Sent with Ratchet Stop and Standards unless otherwise ordered.
Both sizes furnished without extra charge in finished wood case.

LARGER SIZES

No. 224B	8-inch to 9-inch range With lock nut, ratchet stop and three standards in substantial wood case	\$30.00
No. 224C	9-inch to 12-inch range With lock nut, ratchet stop and three standards in substantial wood case	35.00
No. 224D	12-inch to 16-inch range With lock nut, ratchet stop and four standards in substantial wood case	45.00
No. 224E	16-inch to 20-inch range With lock nut, ratchet stop and four standards in substantial wood case	55.00
No. 224F	20-inch to 24-inch range With lock nut, ratchet stop and four standards in substantial wood case	65.00
No. 224K	Set Complete. Range 2 inches to 24 inches, with standards, lock nuts and ratchet stops, in substantial wood cases	257.00
No. 224L	Set Complete. Range 0 to 24 inches, with standards. Same as No. 224K Set with the addition of our No. 436 micrometers with ratchet stops, sizes 1 and 2 inch, as listed on pages 180, 181, 182, in substantial wood cases	272.25
No. 224R	Set Complete. Range 0 to 24 inches, with standards. Consisting of our No. 436 micrometers with ratchet stops, sizes 1, 2, 3, 4, 5 and 6 inch, as listed on pages 180, 181, 182 and our No. 224B, C, D, E and F, in substantial wood cases	289.25

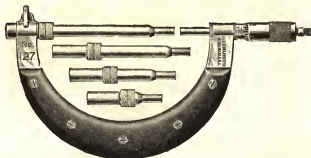
NOTE: Larger sizes of the following ranges:—24 to 28 inches, 28 to 32 inches and 32 to 36 inches, can be furnished when desired. Prices quoted upon application.

No. 224M

Metric

The same as No. 224, except that they are graduated for measurement by hundredths of a millimeter and the thimbles are plain, not marked with decimal equivalents. Furnished in corresponding sizes and prices as above.

United States Government Micrometer Caliper Gages No. 127



These gages were designed and made to meet the requirements of the Government in making big guns and other work in the Ordnance Department of Government shops, where they are now used. The frames are cut from steel plates, nicely finished. The sides are covered with hard rubber, put on with brass screws, preventing inaccuracy through expansion caused by change in temperature when held in the hands. The micrometer screw adjusts one inch, reading $\frac{1}{1000}$ of an inch, and is provided with lock nut. The different length tail spindles, forming anvils, are interchangeable and have positive stops to set against their socketed seats. The adjusting collars on these anvils have notches to facilitate the removal of dirt, which would prevent them from setting accurately against the seat. The contact ends of spindles are slightly convex. Furnished with ratchet stop.

No. 127

English

No. 127 A	0 to 4 inches...	\$ 43.00
No. 127 B	4 " 8 " ...	57.00
No. 127 C	8 " 12 " ...	76.00
No. 127 D	12 " 16 " ...	110.00
No. 127 E	16 " 20 " ...	140.00
No. 127 F	20 " 24 " ...	170.00

No. 127 M

Metric

No. 127 MA	0 to 100 mm.	\$ 43.00
No. 127 MB	100 " 200 " "	57.00
No. 127 MC	200 " 300 " "	76.00
No. 127 MD	300 " 400 " "	110.00
No. 127 ME	400 " 500 " "	140.00
No. 127 MF	500 " 600 " "	170.00

No. 127M the same as No. 127, except that it is graduated for measurement by hundredths of a millimeter.

Furnished in case without extra charge.

Sent without standards unless otherwise ordered.

Packed 1 in a box.

For prices of standards to use with these Micrometers, see page 194.

Larger sizes can be made to order when so desired. Prices quoted on application.

SUPPLEMENT

NEW TOOLS

**Which Have Been Added to Our Line
but Not Shown in**

Starrett Catalog No. 25

**Set of Tools
No. 902**

For Students and Apprentices

Recommended where a more complete set of tools is desired by the apprentice. Similar in style to the set No. 900 shown on page 12 of catalog, only that it contains tools of different patterns, with a one-inch micrometer included.

In folding case, about 1½ in. x 5½ in. x 8 in.



Set complete as shown
in cut contains:

No. 436 x 1 inch Micrometer, without ratchet stop and without lock nut.

No. 11 x 9 inch Combination Square with center head.

No. 391—Center Gage.

No. 117-D—Center Punch.

No. 323—6-inch Flexible Rule in pocket case.

No. 277—4-inch Divider.

No. 275—4-inch Caliper.

No. 274—4-inch Caliper.

No. 243—4-inch Caliper.

PRICE

Complete Set,
with case \$19.50

Starrett

Dial Indicators

The L. S. Starrett Company are pleased to announce their new line of Indicators, commonly referred to as dial gages. No expense or effort has been spared to construct these gages with the durability and accuracy present-day practices and conditions demand. Such Indicators are indispensable in the tool and machine industry, being attachable to tool spindles, machinery, production jigs and fixtures. Essential in inspection work and for mountings where measurements are involved too numerous to estimate. Together with our well-known No. 196 Dial Indicator and the models illustrated in the complete Starrett Dial Indicator Catalog, the buyer is offered an outstanding selection.

These Indicators are rust-proof through the use of stainless steel and chromium-plated parts. All gears, the rack, dowels, screws, stem, bushings, etc., are stainless steel, the case and bezel special die castings, chromium plated. The back cover is also a die casting with black crackle finish. Particular attention has been given to reflection and legibility, sturdiness and accuracy, and interchangeability of parts.

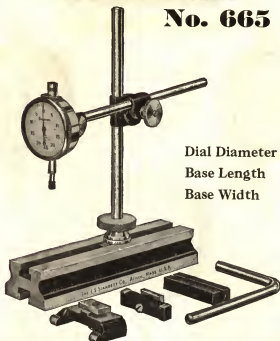
Write for complete Starrett Dial Indicator Catalog and Price List.

Dial Indicators



A few illustrations of STARRETT Dial Indicators. Write for complete Starrett Dial Indicator Catalog and Price List.

Dial Test Indicator No. 665



Dial Diameter $2\frac{1}{4}"$
Base Length $8\frac{1}{2}"$
Base Width $2\frac{1}{4}"$

A sturdily built combination for the general work of inspectors, machinists and toolmakers. The Indicator has a spindle travel of $\frac{3}{10}"$ and reads in half-thousandths from 0-25-0. (Other types of dial indicators for this tool furnished upon request.) The horizontal arm is adjustable to any position and is easily removed for use in the tool post of a lathe. The right angle arm provides further adjustment. The small blocks are clampable in the T-slots of the base, thus providing a guide to check from the edge of a T-slot, work plate, etc.

PRICE

No. 665—Including finished wood case.....\$30.00

No. 665 M—Metric

Same as No. 665, except the dial indicator reads in hundredths of a millimeter (0-50-0) and the spindle travel is 7 mm.

PRICE

No. 665 M—Including finished wood case.....\$30.00

Above numbers packed 1 in a box.

Write for Starrett Complete Dial Indicator Catalog.

Clamp No. 665 G



Made to use with our No. 665 Combination Dial Test Indicator. Increases its utility in the inspection of jigs and fixtures, lining up vises, work on centers, machine platens, etc. Clamp capacity about 3 inches. The swivel brass shoe on the screw prevents injury to a finished surface.

Price.....\$3.00

Packed 1 in a box.

New Rule with Figured Graduations In 10ths—50ths—32nds—64ths



Facilitates measurements where dimensions are in decimals, eliminating necessity of converting decimals into fractions. One side graduated in 10ths and 50ths of an inch. Each 10th of an inch in the 50th graduations is figured—a great help for quick and easy reading in decimals. Hundredths of an inch are estimated readily.

Opposite side of rule graduated in 32nds and 64ths, the 64th graduations being figured every 8th of an inch. The combination of 10ths and 50ths on one side, with 32nds and 64ths on the other, together with the handiness of the figured graduations, makes this rule especially useful and desirable for up-to-date shop work.

PRICES

6-inch Flexible.....\$0.90 each
12-inch Semi-Flexible..... 1.65 each

Inspector's Dial Bench Gage

No. 654

With Sliding Head and Table

Top Control



An excellent gage for measuring rubber, textiles, paper, metal parts, leather, veneer, mica, celluloid, cardboard, fabrics, etc. The dial is graduated to read by thousandths of an inch and reads from 0-25-0. (Will be furnished with other styles of dial gages upon request.)

Has both lever and top control. The lever is pressed downward to lift the spindle and when released allows the spindle to make contact with the work and under a uniform tension regulated by a spring in the dial gage. The lever is positioned at the left but will be furnished to use at the right if desired.

The dial can be adjusted relative to 0; the range $3/10''$. Bezel clamp not standard but furnished on request. The table ($1\frac{1}{2}''$ diameter) is adjustable, as also the dial gage head and with the lateral and fine adjustment of the latter, the gage readily adapts itself to the job. Range 0 to 3 inches. Base diameter, $5\frac{1}{2}$ inches. Height, 8 inches. Weight, approximately 6 lbs. Packed 1 in a box.

PRICES

No. 654—In substantial wood case, fitted }\$35.00
with our No. 25B Dial Gage (as shown) }

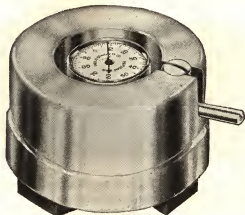
No. 654 M METRIC—Same as above, except dial gage is graduated to read by hundredths of a millimeter. Price same as for No. 654.

Note: Special sizes and shapes of contact points and tables can be furnished upon request.

Write for Starrett Complete Dial Indicator Catalog.

Vibrometer No. 192

For Testing Amplitude of Vibration



This is a simple instrument for measuring the amplitude of vibration of steam or water turbine units or other similar machinery rotating at high speed and where vibration may hamper efficiency. The amplitude readings obtained at or near the bearings of a rotating machine are a significant indication of the existing dynamic balance of its rotor.

The dial indicator is set in a heavy metal retaining ring on the bottom of which are fastened three soft rubber shoes held in dove-tail grooves and are easily replaced. Such a contact provides a friction so when testing on an incline or contour the position of the vibrometer is retained. All parts are chromium and nickel-plated to prevent rust.

The dial gage is removable to permit its use in numerous other ways independent of the mounting. Note also by turning the knurled rim how the hand is positioned in relation to 0.

Price, with case.....\$21.00

Write for complete descriptive circular covering this instrument.

Crank Shaft Distortion Dial Gage or Strain Gage

No. 696



For Checking the Distortion of Engine Shafts and Frames.
Dial registers by thousandths of an inch.
Range from $2\frac{1}{4}$ inches to 18 inches.

An inside measuring gage where the dial registers by thousandths of an inch, which is used for checking the distortion of the webs of crank shafts. This distortion bears a direct relation to any existing misalignment or excessive wear of the bearings. The use of this gage makes it possible to check the bearing alignment or undue deflection of the shaft without having to dismantle the engine. Usable on all Diesel engine shafts as well as the center-crank shafts of any type of engine or compressor. This gage can also be applied as a strain gage on engine frames, while engine is in operation.

PRICES

No. 696.—With sharp points and with leather case. . . . \$24.50

No. 696M Metric.—The same as No. 696 except that it reads $1/100$ mm. Range 58 mm. to 458 mm. 24.50

Write for complete descriptive circular covering this instrument.

Inside Dial Gage No. 697

A Practical Gage for Inside Measurements



An inside measuring gage where the dial registers by thousandths of an inch. This is an excellent gage to use between two walls to quickly ascertain parallelism, also very useful in taking comparative measurements of internal diameters. The measuring contacts are made with convex ends.

The movement of the dial indicator is about $\frac{5}{32}$ inch and with the rods, the 8-inch extension, etc., provides a range from $2\frac{1}{4}$ inches to 18 inches.

There are ten rods and one extension. The rods are marked to designate the approximate over-all length of the gage. Indicator is provided with bezel or ring to adjust dial in relation to the hand and has a non-breakable crystal. The dial is graduated with wide divisions of thousandths of an inch and reads from 0 to .020 to 0, one turn equaling .040.

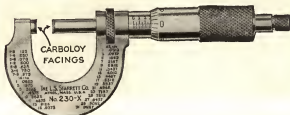
Rods of different lengths will be furnished upon request.

PRICES

No. 697—With round points and with leather case . . . \$24.50

No. 697M Metric—The same as No. 697, except that it
reads 1/100 mm. Range 58 mm. to 458 mm. 24.50

STARRETT
Micrometer Calipers
Nos. 230X and 231X
Range 0 to 1 Inch
Anvil and Spindle with
CarboLOY Facings



And now CARBOLOY faced spindles and anvils in a STARRETT Micrometer. An alloy of practically diamond-point hardness.

Because of its exceptional resistance to abrasion it should prove of economical value. In the constant inspection of fine tolerances, measuring of the many harder materials, where an abrasive condition exists, grinding with compound, etc., in fact where there is a noticeable wear of spindle and anvil ends, the CARBOLOY feature insures a vastly greater endurance. Has lock nut and ratchet stop.

PRICES

No. 230X—For measurements by thousandths up to one inch.....	\$25.00
No. 231X—Same as No. 230X, except graduated for measurements by ten-thousandths up to one inch.....	26.75
Case extra, for either of above numbers.....	1.25

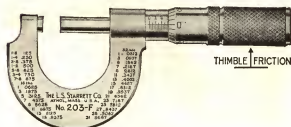
Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

STARRETT

Micrometer Calipers with Thimble Friction

Range 0 to 1 Inch



Designed to eliminate the disadvantages in certain inspection work, etc., that exist where the friction stop is positioned at the end of the thimble. The friction stop mechanism embodied in the thimble reduces the span of the thumb and fingers and enables the operator to more easily use the micrometer with one hand.

PRICES

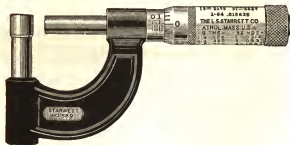
No. 203F—By thousandths.....	\$8.50
No. 230F—By thousandths and with Lock Nut.....	10.00
No. 209F—By ten-thousandths.....	10.25
No. 231F—By ten-thousandths and with Lock Nut.....	11.75
Case extra, for any of above numbers.....	1.25

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Tube Micrometer Caliper No. 569

**Black Enameled Frame
Decimal Equivalents on Thimble
Range 0 to 1 Inch**



Anvil positioned upright to provide a good tool for measuring tubular walls or the thickness from a hole to an edge. Depth capacity, $\frac{3}{4}$ inch. Hole capacity, $\frac{3}{8}$ inch and up. Special forms and diameters of anvil may be furnished when desired.

PRICES

No. 569 Without Ratchet.....	\$7.50
No. 569 With Ratchet.....	8.00

No. 569M

The same as No. 569, except that it is graduated to read to hundredths of a millimeter.

Prices same as for No. 569.

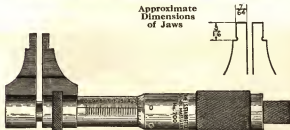
Above numbers sent without ratchet stop unless otherwise ordered.

Packed 1 in a wooden box.

Inside Micrometer Caliper No. 700

Range .200" to 1" by Thousandths

Approximate
Dimensions
of Jaws



Designed to provide a tool to read as a micrometer, with vernier caliper styled jaws, for measuring small internal dimensions. Contact surfaces are hardened and ground. Furnished with lock nut.

Price.....\$14.00
With case.....15.25

Packed 1 in a box.

Ball or Radius Gage No. 710 Specially for Die Sinkers



A compact gage readily applicable to checking, roughing or finished cutters used by die sinkers. Includes diameters in steps of 32nds from $\frac{1}{32}$ inch to 1 inch: this range covering, in the main, a die sinker's requirements. Heretofore mechanics needing a full diameter were compelled to make special gages as they were needed.

The gage while not hardened is made of a specially tough steel. Has bright finish with diameter sizes legibly marked. Approximate dimensions, $\frac{1}{20}$ inch thick, $1\frac{3}{8}$ inches wide and $11\frac{3}{8}$ inches long.

Price.....\$2.25

Packed 1 in a package.

S-14 THE L. S. STARRETT COMPANY, ATHOL, MASS., U.S.A.

Cylinder or Hole Alignment Gage No. 652

Patented



Companion to Starrett Cylinder Gages

This gage is designed to assist in checking cylinder bores from the top of block.

Before using boring bar, make sure all roughness is removed from surface of the block.

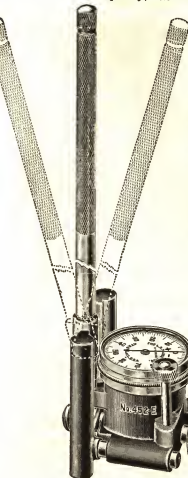
Price\$8.00

Send for complete descriptive folder showing application of this gage.

Improved Cylinder Gage No. 452 E

Patented

Capacity, $2\frac{1}{10}$ inches to 6 inches



The new features in this gage—Combination of Rigid or Toggle Handle—Locking Mechanism—Hardened and Ground Steel Sled.

The Combination Rigid and Toggle Joint Handle erases any doubt among automobile service mechanics as to the universal application of this gage. The handle can be made rigid in a perpendicular or angular position or it may, by a slight turn of the handle, be readily transformed to a universal joint with a wide sweep.

The Locking Mechanism (see stem protruding above dial) clamps the adjustable contact points which are synchronized with the indicating needle. Lock before removing from cylinder and measure for the exact minimum or maximum diameter with a micrometer.

The Hardened and Ground Steel Sled is made from a forging and eliminates the true line contacts wearing so quickly.

All other features are the same as our No. 452 A.

Four Adjustable Rods provide for diameters varying from $2\frac{1}{10}$ to 6 inches.

Price, No. 452 E.. \$17.50

No. 452 ME

Metric

Approximate capacity, 54 mm. to 153 mm.

Same as above except that it reads in $\frac{1}{100}$ mm.

Price..... \$17.50

Send for special circular showing our complete line of Cylinder Gages.

Feeler Stock No. 667 12-Inch Lengths



No. 667 Display Assortment

Starrett Feeler Stock has become a necessity in the automotive field. Equally as important to the manufacturer as to the service stations, where accurate fit means so much to insure quiet running motors. For setting valve tappets, ignition points, ring groove clearance, gear play, fitting pistons, adjusting spark gap, etc. Starrett Feeler Stock is recognized as the standard for accuracy. Even in the shop it is commonly used in experimental work by toolmakers and machinists.

Made in 13 popular thicknesses as follows:

Size	Price per Foot	Size	Price per Foot
.0015.....	\$0.34	.007.....	\$0.20
.002.....	.34	.008.....	.20
.003.....	.34	.009.....	.20
.004.....	.24	.010.....	.20
.005.....	.24	.012.....	.20
.006.....	.24	.013.....	.20
		.015.....	.20

Packing: 12 pieces of a size in a box, each piece in individual envelope.

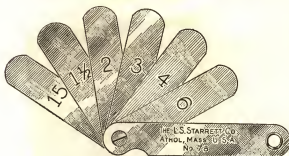
Furnished in convenient 12-inch pieces, each piece marked with its thickness, both ends nicely rounded with no ragged edges. To prevent stain and rust spots from handling, each piece is contained in an individual envelope. Each envelope is correctly marked to show thickness of the pieces enclosed. The Specially Designed Boxes are particularly convenient for the dealer.

No. 667 Display Assortment

Consists of a box (12 pieces) of nine different popular sizes packed in attractive display carton. Twelve pieces of a size in a box, each piece in individual envelope. Extra box for odd pieces.

Complete Display Assortment, as shown above..... \$27.60

Thickness Gage No. 78



THE POPULAR PRICED GAGE

Has six leaves,—.0015—.002—.003—.004—.006 and .015 inches thick. With one leaf or in combination with others the range by thousandths is .0015 to .031. Screw and stud simplifies substitution of new leaf for a damaged one. Case to protect all leaves from bad bends. Eyelet to carry on ring.

Price, each.....\$0.50

Packed 12 in a box, six boxes in a carton.

Also supplied on display card—12 gages on card.

Thickness Gage Holder No. 806 D

Patented



Compares with our No. 806 except it is made to clamp "feeler stock at each end." Convenient for holding two different thicknesses and easily turned end for end in one hand. One of the clamps finished to contrast readily from the other, eliminating possible confusion as to which end holds the thicker or thinner stock.

PRICE

No. 806D—Holder only.....each \$0.75

Packed 6 in a box.

See Page 220, our Catalog No. 25, for listing of No. 806.

Handy Automotive Service Set In Finished Wood Case



Set No. 914

Comprises

	List Price
No. 224 AA—Micrometer, with R. S. and Standards . . .	\$22.25
No. 452 B—Cylinder Gage, with Locking Mechanism . . .	17.50
Price, per set, with case	\$39.75

Dependable tools, such as included in these practical sets, are required in all Motor Service Regrind and Rebores Shops, as well as for general repair and maintenance work.

The special finished wood case, for which we make no additional charge, keeps the tools in excellent condition, ready for use.

Handy Automotive Service Set In Finished Wood Case



Set No. 915

Comprises

	List Price
No. 224 A—Micrometer, with R. S. and Standards.....	\$27.00
No. 452 B—Cylinder Gage, with Locking Mechanism...	17.50
Price, per set, with case.....	<u>\$44.50</u>

The necessity for precision tools, when doing reconditioning work, is keenly recognized.

Protect these regularly used tools by keeping them in this finished wood case, for which we make no additional charge.

Handy Automotive Service Set In Finished Wood Case



Set No. 916

Comprises

	List Price
No. 224 AA—Micrometer, with R. S. and Standards	\$22.25
No. 452 B—Cylinder Gage, with Locking Mechanism . . .	17.50
No. 124 AH—Inside Micrometer with Handle	8.00
No. 172 B—Thickness Gage	2.50
Price, per set, with case	\$50.25

We make no additional charge for this finished wood case.

The mechanic will always find the tools in good condition if kept in the case when not in use.

Handy Automotive Service Set In Finished Wood Case



Set No. 917

Comprises

	List Price
No. 224 A—Micrometer, with R. S. and Standards	\$27.00
No. 452 B—Cylinder Gage, with Locking Mechanism . . .	17.50
No. 124 AH—Inside Micrometer with Handle	8.00
No. 172 B—Thickness Gage	2.50
Price, per set, with case	\$55.00

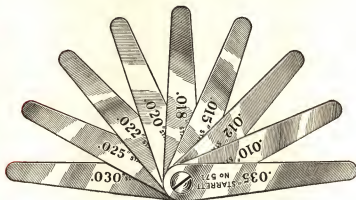
Every reconditioning shop requires accurate precision tools as those included in this set.

Such tools require safe keeping. The finished wood case does just that, and we make no additional charge for it.

Ignition Spacing Gage

No. 571

For Ignition Spacing and Distributor Work



Cut Actual Size

An accurate, properly formed, marked and finished gage for the ignition phase of the automobile field. For auto-electricians, testers and mechanics specializing in engine tune-up and distributor adjusting. Nine tapered leaves of thicknesses to cover the range, whether for spark plugs or breaker points which eliminates the use of two or more leaves, thus lessening the chance of errors in accurate spacings. The thicknesses of the leaves are as follows: .010, .012, .015, .018, .020, .022, .025, .030 and .035. All leaves are suitably hardened. Length, about 2 1/16 inches. Width at large end, 3/8 inch, at small end, 3/16 inch. The leaves are easily replaced by removing the screw stud from the end.

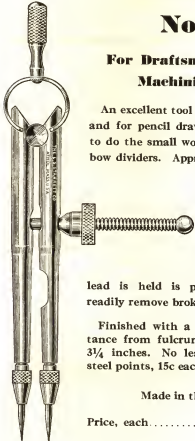
Price.....\$1.25

1 in an envelope. Packed 6 in a box.

Pencil Divider

No. 596

**For Draftsmen, Toolmakers,
Machinists, Students**



An excellent tool for lay-out work on metal, and for pencil drawings. It is not designed to do the small work of the bow pencils and bow dividers. Approximate capacity of opening of points $\frac{3}{16}$ inch to 3 inches. It is made with round legs and with two small chucks for holding the steel points and pencil lead of .086 diameter. The leg in which the pencil lead is held is provided with cut-out to readily remove broken or lodged leads.

Finished with a bright nickel plate. Distance from fulcrum to scribe points about $3\frac{1}{4}$ inches. No leads are furnished. Extra steel points, 15c each.

Made in this one size only.

Price, each.....\$2.00

Actual Size

Packed 2 in a box.

Note: May also be supplied when so desired with hole diameter .075 at the same price.

Draftsmen's Straight Edges Stainless Steel

Straight Edges made especially for draftsmen's use.
Stainless Steel and furnished with a hole at one end.



No. 1381—Not Beveled

Length Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price Each
15	1 $\frac{3}{8}$	.07	\$3.00
18	1 $\frac{3}{8}$	.07	3.75
24	1 $\frac{3}{8}$	.07	5.10
30	2	.07	6.60
36	2	.07	7.90
42	2 $\frac{1}{2}$	.07	9.75
48	2 $\frac{1}{2}$	.07	11.50
54	2 $\frac{1}{2}$	.07	13.25
60	3	.09	15.50
72	3	.09	18.50



No. 1386—Beveled. One edge is beveled

Length Inches	Approximate Width, Inches	Approximate Thickness, Inches	Price Each
15	1 $\frac{3}{8}$	.07	\$3.90
18	1 $\frac{3}{8}$	.07	4.70
24	1 $\frac{3}{8}$	.07	6.30
30	2	.09	8.50
36	2	.09	10.20
42	2 $\frac{1}{2}$	.09	13.00
48	2 $\frac{1}{2}$	.09	15.20
54	2 $\frac{1}{2}$	.09	17.20
60	3	.09	25.00
72	3	.09	30.00

Above numbers packed 1 in a package.

STARRETT
Pocket Slide Calipers
No. 1025
Stainless Steel



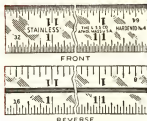
Made of the highest grade of Stainless Steel. The Stainless qualities prevent rust and stain so that a bright finish is retained.

Graduated in 32nds on the stock and 64ths on the slide. The improved clamping device, with left hand thread (see cut), is a valuable feature as it may be locked by the thumb of the same hand in which the tool is held. The two lines on the stock as shown in lower cut enables the user to get either inside or outside measurements.

Size	Depth of Jaws	Nibs When Closed	Price
3-inch	$1\frac{1}{16}$ inch	.125	\$6.75
5-inch	$1\frac{7}{16}$ inch	.250	8.00

Packed 1 in a box.

Stainless Steel Square Blades No. 1033



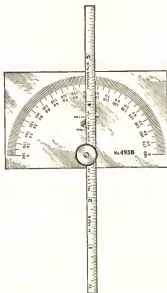
And now the Stainless Steel Square Blade. Made to go with our 12-inch Combination Squares and Sets and interchangeable so the machinist and carpenter who have often wanted a blade, resistant to corrosion and rust, can now own one. Made in 12-inch length only, and with 8ths and 16ths graduations on one side and 32nds and 64ths on the other.

Price, one 12-inch blade.....\$3.25
18-inch and 24-inch sizes quoted on application.

Protractor and Depth Gage No. 493 B

With Rectangular Head

Corresponds to our No. 493 listed on page 98 of our Catalog, except it is made with a rectangular head, thus providing four working edges or faces.



Price, No. 493 B.....\$3.00

Hermaphrodite Calipers No. 563

**With Firm Joint and
Adjustable Round Point**

This caliper is similar to our Nos. 41 and 243, except it is made with a round adjustable point in the straight leg.

For laying off centers and lines from an edge.

PRICES

4-inch.....	\$0.80
6-inch.....	1.00

Packed 3 in a box.



Steel Beam Trammels Additional Attachments

No. 251



Made so that a pen point and chuck (opening .075) to hold pencil leads, etc., may be used with our No. 251 trammel for draftsmen and engineers. As depicted, the shanks of the attachments are clamped in the larger chucks of the trammel.

PRICES

No. 251H—Steel Point, holds leads also.....	each \$0.60
No. 251J—Needle Point.....	each .50
No. 251K—Pen Attachment.....	each 1.80

See page 282 of our Catalog for listing of our No. 251 Trammels.

Packed 1 in a package.



Steel Rules No. 305

Quick Reading with Decimal Equivalents

As the cut shows, this rule has the 32nds and 64ths graduations, with quick reading set up on one side, and the very legible table of fractions and decimal equivalents on the other. Approximate thickness, $\frac{3}{64}$ inch. Width, $\frac{3}{4}$ inch.

PRICE

No. 305—6-inch only.....\$0.90

No. 306

Quick Reading with Letter and Drill Sizes

Another good practical shop rule. One side graduated 64ths and 32nds with quick reading figures. The other side shows letter sizes of drills from A to Z and the diameters in thousandths, also number sizes from 1 to 80 with diameters in thousandths.

PRICE

No. 306—6-inch only.....\$0.90

Above numbers packed 6 in a box.



Flexible Steel Rules

No. 327

With Simplified Quick Reading



An Improved Flexible Steel Rule—graduated in 16ths, 32nds and 64ths, and on both sides of the rule, from one end. No turning end for end nor measuring with figures upside down. Graduations that are used mostly, 32nds and 64ths, are on the lower edges, with quick reading features. The 16ths, regular graduation, is on the upper edge of the 32nds side. Made from finest quality spring tempered steel.

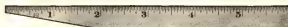
PRICE

No. 327—6-inch only.....each \$0.90

Packed 6 in a box.

No. 328

With Tapered End



One side has plain 64th divisions, other, 32nd divisions. Figures and divisions always in natural position as our No. 324 rule. The gradual taper from the 2-inch line to an approximate end width of $\frac{3}{4}$ inch gives it a greater range than the ordinary rules, as it permits measuring in holes, slots, from shoulders, etc. Same width and thickness as our No. 320 Flexible Rule.

PRICE

No. 328—6-inch only.....each \$0.90

Packed 6 in a box.

Hexagon Aluminum Levels No. 805



There are endless occasions where a check on the horizontal is made without regard to extreme accuracy and because the above levels are compact, light and inexpensive, they are gaining in popularity. Made from $\frac{3}{8}$ inch hexagonal tubing. Vials filled to show yellow. Two lines to center bubble.

Commonly used when installing Oil Burners, etc.

PRICES

No. 805—4-inch length, weight $\frac{1}{4}$ oz..... each \$0.50

No. 805—6-inch length, weight $\frac{1}{2}$ oz..... each .75

Packed 6 in a box.

Prick Punches No. 816

Made with a long tapered point. Hardened and polished and the points nicely ground. Length of each size, 4 inches. Points as illustrated, full size.

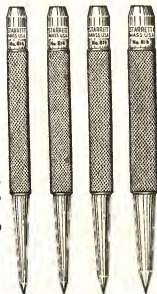
PRICES

Sizes—A-B-C-D, each \$0.20

Sizes—A-B-C-D, per dozen 2.40

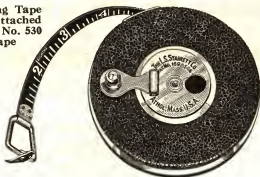
Assorted sizes, one dozen,
3A-3B-3C-3D 2.40

Packed 12 in a box.



Tape Hooks (Patented)

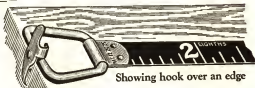
Showing Tape
Hook attached
to our No. 530
Tape



Showing hook not in use



Showing hook in flat surface



Showing hook over an edge

A most satisfactory hook; inbuilt with end link. Folds neatly out of the way when not in use. A Tape with this Hook attached might well be termed—the "one man" tape.

Tape Hook furnished on any of our $\frac{3}{8}$ " Steel Tapes, \$0.20 extra per tape.

In ordering tapes with Tape Hook—specify with Hook after catalog number.

For No. 530 Tape without Hook see page 50.

"Semi-Flex" Tungsten Steel Hand Blades



**For Plumbers, Electricians
and Metal Workers When Cutting
Thin and Soft Metals**

SIZE	14 Teeth per Inch	18 Teeth per Inch	24 Teeth per Inch	32 Teeth per Inch	Approx. Weight per Gross	Price per Gross
8" x $\frac{7}{16}$ " x .025 or 23 Ga.	941	942	943	4	lbs.	\$8.00
10" x $\frac{1}{2}$ " x .025 or 23 Ga.	940	941	942	943	5	lbs. 10.00
12" x $\frac{1}{2}$ " x .025 or 23 Ga.	940	941	942	943	6 $\frac{1}{8}$	lbs. 12.00

This Starrett "Semi-Flex" Blade is our latest development for cutting all kinds of soft metals.

When cutting Pipe, Electrical Conduit, Wire Cable, BX Cable, Tubing and Cornices, without breakage or stripping of teeth, this blade is unexcelled.

The saw for "trouble" jobs. Guaranteed to be practically unbreakable as to blade or teeth, when in use.

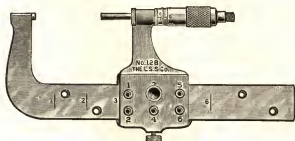
Packed $\frac{1}{2}$ gross in a box.

Order by Catalog Number and Size.

Micrometer Calipers

No. 128

Range 0 to 6 inches

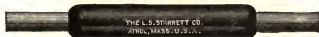


This caliper will measure round work to $4\frac{1}{4}$ inches, and flat work to 6 inches. It weighs 21 ounces, and is rigid and accurate. It can be quickly set to exact position, from 1 inch to 6 inches, by inserting a plug as shown. A valuable feature of this tool is a set of six independent holes through both the movable part and the beam, each hole being bushed with hardened steel bushings, ground and lapped to fit the plug, which locates to exactness the various inch settings. The graduated lines and figures on the beam and movable parts, as shown in cut, eliminate any possible error when inserting the plug. Furnished with ratchet and lock nut.

Price.....\$50.00
With Leather case..... 53.00

Sent with case unless otherwise ordered.

Standard End Measuring Rods No. 234 and No. 234 M With Spherical Ends



These rods are made of steel, hardened and lapped spherical on the ends with a radius of one-half the length of the rod. The handles are of rubber, two-thirds the length of the rod, and guard against any expansion due to change in temperature when held in the hands, thereby maintaining their accuracy under adverse conditions.

1 inch to 6 inch are $\frac{1}{8}$ inch diameter with handles $\frac{7}{16}$ inch diameter.
7 " " 12 " " $\frac{1}{4}$ " " " "

PRICES No. 234 and No. 234 M

1 inch or 25 mm. rod.....	\$1.50	7 inch or 175 mm. rod.....	\$3.30
2 " " 50 " ".....	1.95	8 " " 200 " ".....	3.60
3 " " 75 " ".....	2.10	9 " " 225 " ".....	3.90
4 " " 100 " ".....	2.40	10 " " 250 " ".....	4.20
5 " " 125 " ".....	2.70	11 " " 275 " ".....	4.50
6 " " 150 " ".....	3.00	12 " " 300 " ".....	4.80

No. 137

With Flat Ends



No. 137M

With Flat Ends



These gages are similar to No. 234, except that they are made with flat ends. The 1-inch size is furnished in the form of a disc as shown in the cut.

They are made in both English and Metric sizes. The rods are made of steel, slightly under $\frac{1}{8}$ inch diameter, and the ends are hardened, ground and lapped parallel to each other. The handles are of rubber to guard against any change in their accuracy while held in the hands. Sizes 2 inches to 7 inches have one rubber handle; larger sizes two rubber handles.

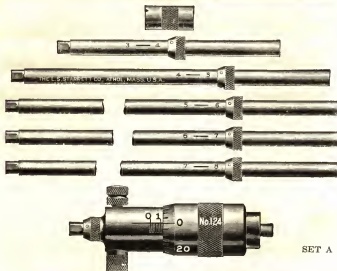
PRICES No. 137 and No. 137 M

1 inch or 25 mm. disc.....	\$1.50	13 inch or 325 mm. rod.....	\$6.50
2 " " 50 " " rod.....	2.00	14 " " 350 " ".....	7.00
3 " " 75 " ".....	2.25	15 " " 375 " ".....	7.50
4 " " 100 " ".....	2.50	16 " " 400 " ".....	8.00
5 " " 125 " ".....	2.75	17 " " 425 " ".....	8.50
6 " " 150 " ".....	3.00	18 " " 450 " ".....	9.00
7 " " 175 " ".....	3.50	19 " " 475 " ".....	9.50
8 " " 200 " ".....	4.00	20 " " 500 " ".....	10.00
9 " " 225 " ".....	4.50	21 " " 525 " ".....	10.50
10 " " 250 " ".....	5.00	22 " " 550 " ".....	11.00
11 " " 275 " ".....	5.50	23 " " 575 " ".....	11.50
12 " " 300 " ".....	6.00		

NOTE: These are the measuring rods to be used in connection with our No. 127 and No. 127M Micrometers, shown on page 192.

Above numbers packed 1 in a package.

Inside Micrometer Calipers No. 124



The above cut shows our inside micrometer caliper, No. 124, which is designed for internal and linear measurements, such as measuring cylinders, rings; also for setting calipers, comparing gages, etc. It is also useful in measuring parallel surfaces. The micrometer screw in the head has $\frac{1}{2}$ inch movement in Sets A and B, one inch in Set C, and, by means of the extension rods furnished, the sizes as given below for each set can be obtained. The extension rods are provided with a collar, against which the rods are conveniently and accurately set in the micrometer head. In setting these rods see that the zero mark on the collar coincides with the zero mark on the micrometer head. With the rods are sent standard gages or rings to slip on the rods under the collars, to further extend the rod. The contact surfaces are all hardened, and provision is made for adjustment, to compensate for wear of the screw and contact surfaces.



HANDLE

The auxiliary handle as shown in cut, for use with sets A, B and D, is designed to go on the side opposite the lock screw, which may be distinguished by its small groove. To insert the handle it may be found necessary to use a clamp or pliers on the knurled stud, after which the stud may be easily removed.

Inside Micrometer Calipers

No. 124 — Continued

Set A has 6 rods and one $\frac{1}{4}$ -inch gage, and measures from 2 inches to 8 inches.

Price.....\$7.25 With case.....\$9.00

Set B has 10 rods and one $\frac{1}{4}$ -inch gage, and measures from 2 inches to 12 inches.

Price.....\$8.50 With case.....\$11.25

Set C has 4 rods and one 1-inch and two 2-inch gages, and measures from 8 inches to 32 inches.

Price.....\$10.25 With case.....\$14.25

Set D comprises sets A and C, and measures from 2 inches to 32 inches.

Price.....\$17.50 With case.....\$22.50

Handle, extra.....\$0.75

No. 124 M

Metric

The same as No. 124, except that it is graduated to read in hundredths of a millimeter.

Set A has 6 rods and one 12 mm. gage and measures from 50 mm. to 200 mm.

Price.....\$7.25 With case.....\$9.00

Set B has 10 rods and one 12 mm. gage, and measures from 50 mm. to 300 mm.

Price.....\$8.50 With case.....\$11.25

Set C has 4 rods and one 25 mm. and two 50 mm. gages, and measures from 200 mm. to 800 mm.

Price.....\$10.25 With case.....\$14.25

Set D comprises sets A and C, and measures from 50 mm. to 800 mm.

Price.....\$17.50 With case.....\$22.50

Handle, extra.....\$0.75

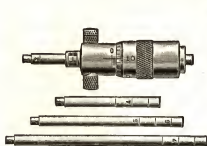
Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.



No. 124, Set C

Inside Micrometer Calipers No. 120



SET A

Both sets have screw and nut the same as an outside Micrometer Caliper and read in thousandths. Set A measures from 2 inches to 8 inches, has $\frac{1}{2}$ inch movement of screw and requires four extension rods. The rods are provided with a hardened steel adjustable anvil in ends, which permits adjusting for wear. A small binding screw locks rods when set. Rods are marked in $\frac{1}{4}$ inch divisions and set to a similar line on a projection of the barrel.

Set C is similar in all respects with the exception that it measures from 8 inches to 32 inches, with four extension rods, and has a lock for the rods; and has one inch movement of the screw. This is a very strong and serviceable tool as well as an accurate one. We can furnish rods of extra lengths for these tools when desired.



SET C

Inside Micrometer Calipers

No. 120—Continued

When so ordered an auxiliary handle similar to the one furnished with No. 124 accompanies Sets A, B and D, which is used by removing the nut opposite the lock nut and screwing the handle in place of same, thereby enabling one to take measurements in holes and other places where the micrometer could not otherwise be used.

PRICES NO. 120

Set A	With 4 rods, to measure from 2 to 8 inches	\$ 6.75	With case	\$ 8.50
Set B	" 7 " " " 2 " 12 " "	7.50	" "	10.25
Set C	" 4 " " " 8 " 32 " "	9.25	" "	13.25
Set D	Comprising Sets A and C	16.00	" "	21.00
Handle, extra		\$0.75		

No. 120 M

Metric

The same as No. 120, except that it is graduated to read in hundredths of a millimeter.

PRICES NO. 120 M

Set A	To measure from 50 mm. to 200 mm.	\$ 6.75	With case	\$ 8.50
Set B	" " " 50 " " 320 " "	7.50	" "	10.25
Set C	" " " 200 " " 765 " "	9.25	" "	13.25
Set D	Comprising Sets A and C	16.00	" "	21.00

Handle, extra.....\$0.75

Above numbers sent without case unless otherwise ordered.

Packed 1 in a box.

Height Gage Attachment No. 447

This cut shows a steel base for holding our inside micrometer No. 124, sets A and B (page 197), for use as a height gage, serving in many cases where the purchase of a more expensive tool would otherwise be required. The anvil end is even with the bottom of the base and the micrometer is held perpendicularly as shown in cut, making a reliable gage. A slight turn of the knurled screw instantly clamps it to or releases it from the base.

PRICE

Attachment only.....\$2.50



Inside Micrometer Calipers No. 121

When linear measurements are beyond the capacity of the ordinary micrometer it is frequently necessary to have a more accurate instrument than the rule or steel tape. The inside calipers shown here were designed for and are now used by the Government in navy yards and arsenals. They consist of steel tubes with telescoping extensions combined with a one-inch screw micrometer movement. The tubes are accurately graduated and figured in inches and set to the inch marks showing the length wanted, and are firmly held by a knurled locking nut. The ends of the rods have hardened steel anvils. Combinations are possible which give a range from 32 to 107 inches and with micrometer accuracy over the whole range. These inside micrometer calipers are nickel plated. A case is furnished with each set.

PRICES

Set A Stock with one rod, 32 to 57 inches.....	\$38.50
Set B Stock with two rods, 32 to 82 inches.....	45.75
Set C Stock with three rods, 32 to 107 inches.....	56.50

No. 121M

Metric

The same as above, except that it is graduated to read in hundredths of a millimeter.

PRICES

Set A Stock with one rod, 800 mm. to 1440 mm.....	\$38.50
Set B Stock with two rods, 800 mm. to 2070 mm.....	45.75
Set C Stock with three rods, 800 mm. to 2700 mm.....	56.50
Above numbers packed 1 in a box.	





Whether shrink, close or loose—you'll find this telescoping gage a mighty time saver.

Starrett telescoping gages No. 229 are made to measure the exact diameter of any hole from one half inch to six inches.

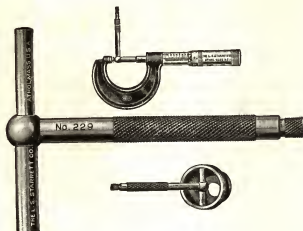
There are no points to catch in the work, no legs to spring. Measuring points finished broad convex but in relation to the smallest capacity of each gage.

You'll find little difficulty in working in holes or inside measurements to close limits with a Starrett 229 and a Starrett outside micrometer to transfer to.

See page 202 for description and prices No. 229.

Telescoping Gages

No. 229



These are instruments from which the exact size of holes or slots can be taken by an outside caliper or micrometer, so that shrink, close or loose fits, varying in thousandths, or less, can be made and measured. The plunger is locked by a slight turn of the knurled screw in the end of the handle.

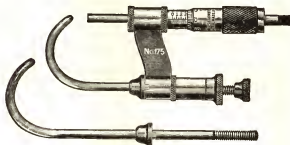
PRICES

No. 229 A	Range $\frac{1}{8}$ inch to $\frac{3}{4}$ inch	each	\$1.80
No. 229 B	Range $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches	each	2.10
No. 229 C	Range $1\frac{1}{4}$ inches to $2\frac{1}{2}$ inches	each	2.40
No. 229 D	Range $2\frac{1}{2}$ inches to $3\frac{1}{2}$ inches	each	3.00
No. 229 E	Range $3\frac{1}{2}$ inches to 6 inches	each	3.60
No. 229	Set of 3—One each sizes A-B-C packed in special red leatherette case		7.30
No. 229	Set of 5—One each sizes A-B-C-D-E packed in special red leatherette case		14.40
	Case Only for Set of 3		1.00
	Case Only for Set of 5		1.50

Inspectors' Micrometer Caliper Gage

No. 175

For Testing Boilers, Flues, Tubing, Drawn Die Work, Etc.
Used by U. S. Government Inspectors



This gage was designed particularly for measuring the walls of cylindrical forms through a drilled hole in a flue or pipe where it would not be otherwise possible to secure accurate measurements. This gage is made to read by thousandths of an inch and its peculiar construction makes it possible to obtain as exact readings as upon flat material. It is furnished with two anvils which are interchangeable, whereby measurements may be taken from 0 to 2 inches. The anvils have a positive stop and are held fast to the seat containing a key-way, by the large nut. The smaller nut is used to turn the anvil when released from its seat. The small cut shows the anvil turned out of position. They are furnished with lock nut and ratchet stop. A 1-inch standard plug is also furnished to set the gage when using the anvil for measurements from 1 inch to 2 inches.



Price, with Leather Case, \$27.00
Packed 1 in a case

Inspectors' Gages No. 30



This gage was designed at the suggestion of a government inspector to fill the need of a tool for measuring the thickness of ship plates, boiler plates, etc., where measure has to be taken thru a bolt hole or hole drilled for the purpose. The contact point is carried in beyond any hurr formed by drilling, insuring correct measurement.

The slide measuring rod is graduated on two opposite sides, one side reading 32ds, the other 40ths. Reading from the top of the knurled friction slide, which, after the contact ends of the gage are brought together against the object being measured, is slipped down against the top, the graduations above it show the exact measure. Then the measuring rod may be instantly withdrawn, the book part removed and all taken to the light and the correct measure, indicated above the friction slide, easily read.

The knurled nut over the split hub serves to contract same to fit close on the slide or to lock firm, making a solid gage, convenient for any mechanic.

The gage weighs about 1 ounce and is adapted for the vest pocket. Width, 1 inch. Capacity, $1\frac{1}{2}$ inches.

Price.....\$3.75

No. 30 M

Metric

Capacity, 47 mm. Rod graduated one side in mm., the other in $\frac{1}{4}$ mm.

Price.....\$3.75

No. 31



This gage is similar to our No. 30, except that it is made narrower for use in smaller holes. Width, $\frac{1}{8}$ inch. Capacity, $1\frac{1}{4}$ inches. Graduated one side in 32ds, the other 40ths.

Price.....\$5.75

No. 31 M

Metric

Capacity, 47 mm. Graduated in mm. and $\frac{1}{4}$ mm.

Price.....\$5.75

Above numbers packed 1 in a box.

Screw Pitch Gages

If not known, the pitch of a thread may be readily determined by comparison with the standards given on our improved screw pitch gages. On the edge of the thin leaves there are teeth corresponding to standard thread sections and by placing leaves successively over the thread, some one leaf will coincide or mesh with the thread, when the pitch can be read from the stamping on the leaf.

The free end of the leaf is made narrow, permitting it to be inserted in a small nut so that either outside or inside threads may be compared.

Our screw pitch gages are stamped on each leaf with decimals to show the double depth of thread, which, of course, equals the depth of threads on the two sides of a tap having the same pitch. This enables the workman to determine what size of drill must be used to leave a full V-thread for a tap having the same pitch. To do this, caliper with a micrometer over the threads of the tap and from its size in thousandths shown, deduct those decimals given on the pitch gage leaf which agree with the pitch of the tap. The result will show in thousandths the size of drill needed for a full thread. Allowance is to be made for the amount the thread is to be flattened.

Formula for depth of threads for a V thread:

$$d = D - \frac{1.733}{N}$$

Formula for U. S. Standard:

$$d = D - \frac{1.299}{N}$$

D = Outside diameter of tap.

d = Bottom

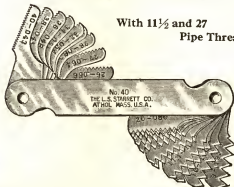
N = Number of threads per inch.

No. 40

22 Pitches, 9 to 40, V Thread

With $11\frac{1}{2}$ and 27

Pipe Thread Pitches



The gage has 22 pitches, viz.: 9, 10, 11, $11\frac{1}{2}$, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40.

Price..... \$1.25

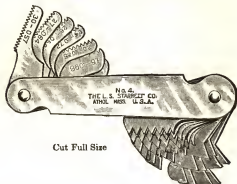
Packed 1 in a box—6 boxes in a carton.

For Positive Stop Thread Gages see pages 210 and 211.

Screw Pitch Gages

No. 4

24 Pitches, 4 to 30, V Thread



Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30. The teeth are sharp and clean cut. Like our No. 40, it can be used inside of a nut as well as on the outside of a screw or bolt. It is also a convenient and reliable tool to use as a 60-degree center gage and gage to test the grinding of either an inside or outside threading tool.

Price.....\$1.50

No. 5

26 Pitches, 32 to 82, V Thread

Of the same form as our No. 40 Screw Pitch Gage, for inside and outside work. Has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82.

Price.....\$1.50

No. 6

30 Pitches, 4 to 42, V Thread

Of the same form as our No. 4 Screw Pitch Gage. Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42.

Price.....\$1.75

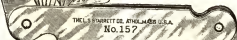
Above numbers packed 1 in a box—6 boxes in a carton.

For Positive Stop Thread Gages see pages 210 and 211

Bicycle Screw Pitch Gage

No. 157

22 Pitches, 32 to 74, V Thread



Has 22 pitches. Similar in design to No. 40. It is made for the use of bicycle manufacturers, electricians, and others using screws with fine V threads. It has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74.

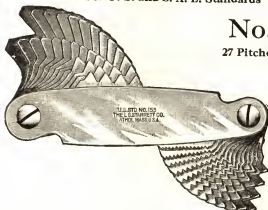
Price.....\$1.25

Screw Pitch Gage

For U. S. and S. A. E. Standards

No. 155

27 Pitches, 2 1/4 to 28



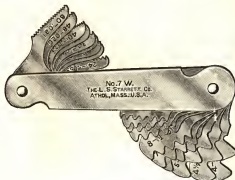
This gage has 27 pitches, viz.:
2 1/4, 2 3/8, 2 1/2,
2 5/8, 2 3/4, 2 7/8,
3, 3 1/4, 3 1/2, 4,
4 1/2, 5, 5 1/2, 6,
7, 8, 9, 10, 11,
12, 13, 14, 16,
18, 20, 24, 28.
Also a center
gage with
coarse and fine
notch.
Price....\$2.00

Packed 1 in a box—6 boxes in a carton
For Positive Stop Thread Gages see pages 210 and 211.

Whitworth Screw Pitch Gage

No. 7

26 Pitches, 4 to 60



Has the following
pitches: 4, 4½, 5, 6,
7, 8, 9, 10, 11, 12, 13,
14, 16, 18, 19, 20, 22,
24, 25, 26, 28, 30, 32,
40, 48, 60.

Price.....\$1.50

For Whitworth
Standard Thread
only.

Metric Screw Pitch Gage

No. 156

28 Pitches, .25 to 2.50



This gage is similar in design to our No. 40, with V thread.

The base of this system is one millimeter, and the blades are stamped with the pitch or the distance from the center of one tooth to the center of the next expressed in millimeters or fractional parts thereof.

It has the following pitches: .25, .30, .35, .40, .45, .50, .55, .60, .65, .70, .75, .80, .85, .90, 1.00, 1.10, 1.20, 1.25, 1.30, 1.40, 1.50, 1.60, 1.70, 1.75, 1.80, 1.90, 2.00, 2.50, that is from ¼ millimeter up to 2½ millimeters.

Price.....\$1.25

Above numbers packed 1 in a box—6 boxes in a carton.
For Positive Stop Thread Gages see pages 210 and 211.

International Standard Screw Pitch Gage

No. 158

17 Pitches, 0.5 to 7

It is made after the French system adopted by the Society for Encouragement of National Industries.



The leaves are stamped to show, on the same leaf, in millimeters, both the pitch and the diameter of bolt.

The gage contains the following pitches: 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5 and 7 millimeters.

This gage also contains a center gage with coarse and fine notches, for use in grinding thread tools.

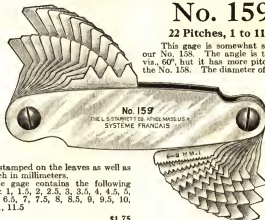
Price \$1.25

Screw Pitch Gage for Metric System

No. 159

22 Pitches, 1 to 11.5

This gage is somewhat similar to our No. 158. The angle is the same, viz., 60°, but it has more pitches than the No. 158. The diameter of screw or



bolt is stamped on the leaves as well as the pitch in millimeters.

The gage contains the following pitches: 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5

Price \$1.75

Above numbers packed 1 in a box—6 boxes in a carton.

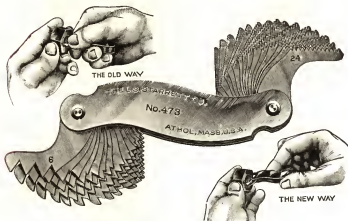
*

Positive Stop Screw Pitch Gage No. 473

Patented

30 Pitches, 6 to 60, V Thread

With $11\frac{1}{2}$ and 27 Pipe Thread Pitches



This gage has a positive stop which holds the leaves in a fixed and convenient position for use.

It has 30 pitches from 6 to 60 inclusive, as follows:

6, 7, 8, 9, 10, 11, $11\frac{1}{2}$, 12, 13, 14, 15, 16, 18, 20, 22 in one end of the case.
24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 48, 50, 56, 60 in the other.

The number of the pitch is stamped on the right side of each leaf.

Price.....\$1.80

Packed 1 in a box—6 boxes in a carton.

Positive Stop Screw Pitch Gage No. 474

(Patented)

30 Pitches, 26 to 82, V Thread

This gage is similar in design to the No. 473, shown on the preceding page, but has finer pitches and will therefore meet the requirements of automobile and bicycle manufacturers, electricians and others using screws with fine V thread.

The gage contains 30 leaves with pitches as follows:

26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52 in one end of the case;
54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82 in the other.

Price.....\$1.80

Positive Stop Screw Pitch Gage No. 475

(Patented)

26 Pitches, V Thread

This gage is similar in design to the No. 473 but larger and has coarse pitches containing 26 leaves with pitches as follows:

3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12 in one end of the case;
13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32 in the other.

Price.....\$1.50

Positive Stop Screw Pitch Gage No. 476

(Patented)

30 Pitches, 3½ to 60, Whitworth Standard



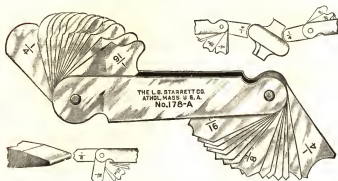
This gage is put up in the same size case as the No. 473 and contains 30 leaves with pitches as follows:

3½, 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18 in one end of the case;
19, 20, 22, 24, 25, 26, 28, 30, 32, 36, 40, 44, 48, 50, 60 in the other.

Price.....\$1.80

Above numbers packed 1 in a box—6 boxes in a carton.

Fillet or Radius Gages No. 178



This gage may also be described as a concave and convex gage, and is especially adapted for use in laying out special forming tools, dies, etc., as well as for measuring fillets. The illustrations show a few of the ways in which the gage can be used. We recommend it for the use of machinists, tool makers, and screw machine operators, as well as pattern makers.

Size A has 30 leaves stamped to indicate radii by 64ths, from $\frac{1}{16}$ in. to $\frac{1}{2}$ in. (one-half diametric size). Diameters are from $\frac{1}{8}$ in. to $\frac{1}{2}$ in., varying by 32ds.

Size B is made with 32 leaves stamped to indicate radii by 64ths, from $\frac{1}{16}$ in. to $\frac{1}{2}$ in. Diameters are from $\frac{1}{8}$ in. to 1 in., varying by 32ds. The style of case for size B is the same as that of No. 155 Screw Pitch Gage, page 207.

PRICES

No. 178 A	Each	\$1.50
No. 178 B	"	2.00

No. 178M

Metric

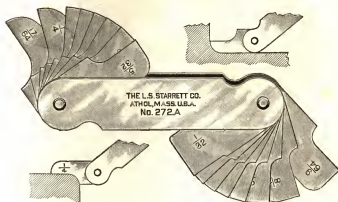
Metric. Size A has 34 leaves, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7 mm. Size B has 32 leaves, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15 mm.

PRICES

No. 178 MA	Each	\$1.50
No. 178 MB	"	2.00

Above numbers packed 1 in a box—6 boxes in a carton.

Fillet or Radius Gages No. 272



This gage is similar in design to our No. 178 and affords means of obtaining the radii of fillets, corners, etc., as shown by the illustrations. Each blade is stamped with the radius in 64ths, the external being on one side and the internal on the other. It can be used in any position or at any angle, the formation allowing it to be used up to a shoulder, and for duplicating sample pieces. The studs holding blades in place are eccentric with the round end of case. This is of advantage as when the gage is opened the edge of case stands well away from the edge of the leaves.

Size A has 16 leaves, with radii from $\frac{1}{16}$ to $\frac{15}{16}$ in., inclusive, by 64ths.

Size B has 16 leaves, with radii from $\frac{1}{16}$ to $\frac{15}{16}$ in., inclusive, by 64ths.

PRICES

No. 272 A	Each	\$1.25
No. 272 B	"	1.80

No. 272 M

Metric

Metric. Size A has 18 leaves, .75, 1., 1.25, 1.5, 1.75, 2., 2.25, 2.5, 2.75, 3., 3.25, 3.5, 3.75, 4., 4.25, 4.5, 4.75, 5 mm.

Size B has 16 leaves, 5.5., 6., 6.5, 7., 7.5, 8., 8.5, 9., 9.5, 10., 10.5, 11., 11.5, 12., 12.5, 13 mm.

PRICES

No. 272 MA	\$1.25
No. 272 MB	1.80

Above numbers packed 1 in a box—6 boxes in a carton.

Fillet or Radius Gage No. 279



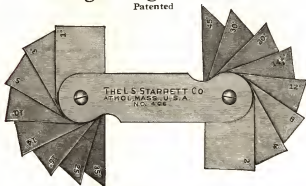
The above cut shows a radius gage similar in design to our No. 272 except that it has twenty leaves with radii from .020 to .400 inch inclusive. Nine leaves have concave and convex radii from .020 to .100 inclusive by .010 inch, four leaves with concave and convex radii from .125 to .200 inclusive by .025 inch, one leaf with concave and convex radii of .250 inch, three leaves with concave radii only from .300 to .400 inclusive by .050 inch and three leaves with convex radii only from .300 to .400 by .050 inch.

Price.....\$1.35

Packed 1 in a box—6 boxes in a carton

Angle Gage No. 466

Patented



This gage contains sixteen leaves, the ends being ground on an angle to degrees. The leaves are of spring tempered steel and their two sides, as well as the angle edge, are ground.

A convenient tool and time saver and, in many instances, takes the place of a protractor. Useful to inspectors, toolmakers and die sinkers, when drop-forged dies are made. Embodies a combination of angles most frequently used, including $14\frac{1}{4}^\circ$ or $\frac{1}{2}$ the Acme Standard (29° included angle). The gage is about $\frac{1}{16}$ inch thick, $1\frac{1}{4}$ inch wide and $4\frac{1}{8}$ inches long.

Angles are as follows: 1° , 2° , 3° , 4° , 5° , 8° , 10° , 12° , 14° , $14\frac{1}{4}^\circ$, 15° , 20° , 25° , 30° , 35° , 45° .

Price.....\$4.75

Packed 1 in a box.

Thickness Gage or Feeler Stock

No. 666

25 ft. rolls in Compact Cases



This roll stock is $\frac{1}{8}$ inch wide and marked every 6 inches with a line, STARRETT and thickness in thousandths. This enables accurate cutting, no waste, at the tool crib for the workman or for sale at the jobber's. Simply snip off the length desired. Compact case about $\frac{3}{4}$ inch thick and $3\frac{1}{2}$ inches in diameter.

Used for gear play, fitting pistons, ring groove clearance, spark gaps, valve tappet clearance, etc.

No. 666	Price of complete 25 ft. rolls.
25 ft. of .0015 at 34¢ per ft.	\$8.50
25 ft. of .002 at 34¢ per ft.	8.50
25 ft. of .003 at 34¢ per ft.	8.50
25 ft. of .004 at 24¢ per ft.	6.00
25 ft. of .005 at 24¢ per ft.	6.00
25 ft. of .006 at 24¢ per ft.	6.00
25 ft. of .007 at 20¢ per ft.	5.00
25 ft. of .008 at 20¢ per ft.	5.00
25 ft. of .010 at 20¢ per ft.	5.00
25 ft. of .015 at 20¢ per ft.	5.00

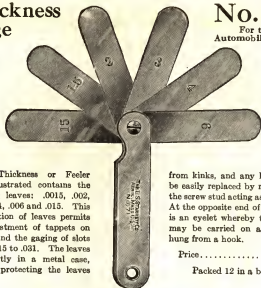
Use our No. 806 Holder with this stock.

Described on page 220.

Thickness Gage

No. 71

For the
Automobile Trade



The Thickness or Feeler Gage illustrated contains the following leaves: .0015, .002, .003, .004, .006 and .015. This combination of leaves permits the adjustment of tappets on motors and the gaging of slots from .0015 to .031. The leaves fold neatly in a metal case, thereby protecting the leaves

from kinks, and any leaf may be easily replaced by removing the screw stud acting as a pivot. At the opposite end of the case is an eyelet whereby this gage may be carried on a ring or hung from a hook.

Price.....\$0.90

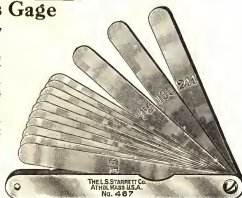
Packed 12 in a box

Thickness Gage

No. 467

This gage contains thirteen leaves as follows: .0015, .002, .003, .004, .006, .008, .010, .020, .030, .040, .075, .100 and .200. Each leaf is about $4\frac{1}{2}$ inches long, $\frac{1}{2}$ inch wide, and clearly marked to show thickness. Many combinations by thousandths of an inch are possible. A handy gage for measuring space within its capacity, where standard gages and other types of tools for such work are not available.

Price.....\$3.50



No. 467M

Metric

Same as No. 467 except that leaves are marked as follows: .04, .05, .06, .07, .08, .10, .15, .20, .30m/m, 1, 2, 3, and 5 m/m.

Price.....\$3.50

No. 467 and No. 467M packed 1 in a box.

Thickness Gages or "Feelers" No. 72



22 Leaves

.004-.025

This gage has 22 leaves, varying in thickness by thousandths, running from .004 to .025. The thickness of each leaf is designated by the number upon it. Each leaf may be used singly or in combination with others, and any thickness in thousandths within their limits may be quickly obtained. The leaves are $\frac{3}{8}$ inch wide by $2\frac{5}{16}$ inches long and fold within the case, which is $2\frac{3}{4}$ inches long, a convenient size to carry in the pocket.

Price \$2.50

No. 72 M

Metric

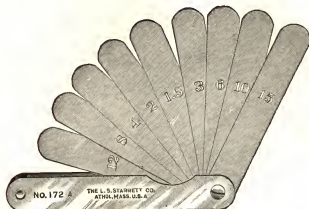
This gage has twelve leaves, varying in thickness by 100ths of a millimeter and running from .04 of a millimeter to 3 millimeters. The thickness of each leaf is designated by the number upon it. Similar to No. 72 above, except that the leaves are 3 inches long.

Price \$2.50

Above numbers packed 1 in a box—6 boxes in a carton.

Thickness Gages

No. 172



This gage is particularly popular with machinists and tool makers in gaging narrow slots, as well as with the motor mechanic in adjusting the air gap for the valves on motors.

Size A has nine leaves, viz.: .0015, .002, .003, .004, .006, .008, .010, .012 and .015.

Sizes B and C have eight leaves the same as A with the omission of .0015.

The leaves are tempered and have the thickness marked upon them.

Size A is made with either straight leaves as shown above, or with tapering leaves as shown in No. 172 M. Sent with straight leaves unless otherwise ordered.

Sizes B and C are made with tapering leaves only, as shown in No. 172 M.

Sizes D and E have eight (straight) leaves viz: .002, .003, .004, .005, .006, .008, .010 and .015.

As with all our thickness gages, when any leaf becomes impaired it can easily be replaced.

PRICES

No. 172A	Leaves $3\frac{1}{4}$ inches long, $\frac{1}{4}$ inch wide.....	\$1.50
No. 172B	Leaves $4\frac{1}{4}$ inches long, $\frac{1}{4}$ inch wide.....	2.50
No. 172C	Leaves 6 inches long, $\frac{1}{4}$ inch wide.....	3.00
No. 172D	Leaves 9 inches long, $\frac{1}{4}$ inch wide.....	3.25
No. 172E	Leaves 12 inches long, $\frac{1}{4}$ inch wide.....	4.25

Size A will be sent unless otherwise ordered.

Sizes A, B and C—Packed 1 in a box—6 boxes in a carton.

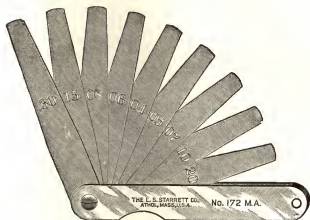
Size D—Packed 6 in a box.

Size E—Packed 3 in a box.

Thickness Gages

No. 172 M

Metric



These gages have nine tapered leaves, tempered, and marked in 100ths of a millimeter as follows: .04, .05, .06, .07, .08, .10, .15, .20 and .30.

PRICES

No.172MA Case	8 cm. long x 8 mm. wide; leaves	7 cm. long x 8 mm. wide	\$1.50
No.172MB	" 12 " " " 8 " " " 11 " " " 8 " "	" " " " " "	2.50
No.172MC	" 16 " " " 8 " " " 15 " " " 8 " "	" " " " " "	3.00

No. 172 MA sent unless otherwise ordered.

Packed 1 in a box—6 boxes in a carton.

Thickness Gages No. 66

With .0015
and .0025
Leaves



This gage has 26 leaves, $\frac{1}{4}$ inch wide, $3\frac{1}{4}$ inches long, of the following thicknesses: .0015, .002, .0025, .003, .004, .005, .006, .007, .008, .009, .010, .011, .012, .013, .014, .015, .016, .017, .018, .019, .020, .021, .022, .023, .024, .025.

Overall length of gage when open, $6\frac{1}{4}$ inches.

Price \$3.50

Packed 1 in a box, 4 in a carton.

Thickness Gage Holder No. 806

For Automobile Mechanics
Patented



Holds any thickness from .0015 to .025. Something new for the use of single leaves and strips. By way of clamping in holder a "feeler", defective from use, can be snapped and then continued to be withdrawn until entirely used up.

No more cutting of fingers as comes from the edges, when handling strip stock and single leaves.

The holder is about $\frac{3}{32}$ inch thick, $\frac{9}{16}$ inch wide and $5\frac{1}{4}$ inches long. It has dull nickel finish and has the eyelet feature at one end.

Six inch leaves are recommended for this holder which in combination with the length of the holder, gives a range for all general purposes on aeroplanes, automobile, truck, tractor, motor boat or motorcycle.

PRICE

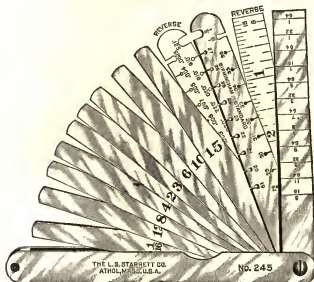
No. 806 Holder only \$0.50

Packed 6 in a box.

Engineers' Taper, Wire and Thickness Gage

No. 245

Patented



This gage is especially designed for the use of marine engineers, machinists and others desiring a set of gages in compact form.

The taper gage shows the thickness in 64ths to $\frac{3}{8}$ ths of an inch on one side, and on the reverse side is graduated as a rule three inches of its length, reading in 8ths and 16ths of an inch.

The wire gage, English Standard, shows on one side sizes numbered from 19 to 36, with two extra slots, one $\frac{1}{8}$, the other $\frac{1}{4}$ of an inch, and on the reverse side shows the decimal equivalents expressed in thousandths. This gage has also 9 thickness or feeler gage leaves, approximately $4\frac{1}{2}$ inches long, of the following thicknesses: .002, .003, .004, .006, .008, .010, .012, .015 and $\frac{1}{16}$ th of an inch all folded within the case, which is $4\frac{1}{2}$ inches long, convenient to handle or to carry in pocket.

Price.....\$5.00

No. 245 M

Metric

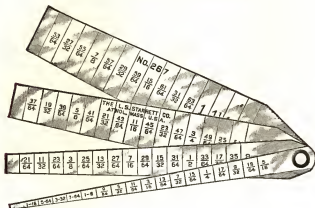
The same as our No. 245, except that it reads in metric measurement. Prices same as for No. 245.

Above numbers packed 1 in a box.

Taper Gages

No. 267

Specially Adapted for Tubing Gage



The thin leaves of this gage are tapering, the width varying by $\frac{1}{4}$ inch to every $\frac{1}{4}$ inch of their length. They are graduated in $\frac{1}{4}$ inches and figured to read in fractions of an inch from $\frac{1}{64}$ inch up to $1\frac{1}{8}$ inch. The gage is designed for brass and steel tube manufacturers for inside measurements, and it is also very convenient for mechanics' use to measure the width of slots and size of holes in nuts drilled for tapping. It is also useful for setting calipers to sizes within its capacity.

Price.....\$4.00

No. 267 M

Metric

The same as our No. 267, except that it is graduated in millimeters to read from 1.5 millimeters to 27 millimeters, by $\frac{1}{2}$ millimeters.

Price same as our No. 267.

Above numbers packed 1 in a box

Taper Gages

Reading in Thousandths of an Inch

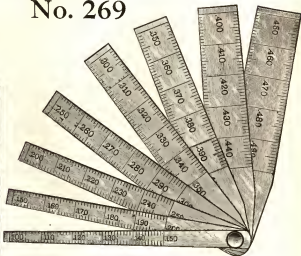
No. 269



No. 270

Obverse

Reverse



These gages are recommended by mechanics for their wide scope and general utility. They are useful in determining the size of holes in dies, etc. They are made from spring-tempered stock .012 inch thick.

No. 269A is $2\frac{1}{2}$ inches long, and is graduated to read from $\frac{1}{10}$ to $\frac{1}{2}$ inch in thousandths of an inch.

No. 269B is $2\frac{3}{4}$ inches long, and is graduated to read from $\frac{1}{2}$ to 1 inch in thousandths of an inch.

PRICES

No. 269A	With 8 leaves	\$5.50
No. 269B	" 10 "	6.75

Taper Gage No. 270

This steel taper gage is primarily valuable on bearing work and gaging slots. It is made of tool steel $\frac{1}{8}$ inch wide and $6\frac{1}{4}$ inches long. One side is graduated to read from .010 inch to .150 inch by thousandths of an inch while the reverse side is graduated to read from $\frac{1}{10}$ mm. to 4 mm. by $\frac{1}{50}$ mm.

Price.....\$3.75

Above numbers packed 1 in a box.



Starrett Tool Steel Parallels—hardened and ground

If you are doing much checking or layout work you will find that a set of Starrett parallels will come in mighty handy.

On machine platens and face plate set-ups, for milling, grinding and shaper vises—in fact for many applications around the shop they are indispensable.

Ground and finished in pairs of six inch length—they are supplied in individual pairs or in standard sets of four pairs each which will give you a wide variety of practical working combinations.

Your dealer will be glad to show you the Starrett No. 384 Tool Steel Parallels.

Hardened and Ground Tool Steel Parallels No. 384



Set No. 1



Set No. 2

For equipment in tool rooms and machine shops or for the individual mechanic, one or more pairs of parallels are of great value.

In milling, grinding and shaper vises, on machine platens and face plate "set-ups" and in checking and laying out work they are a necessity. We do not aim to list the many sizes necessary to meet the various opinions among mechanics as to what dimensions are best, but we have standardized 8 pairs of parallels, any one of which we believe a good addition to the mechanic's tool box. The sets as listed below make possible many combinations. There are many vises where one set or the other can be used to good advantage.

These parallels are made from a special grade of tool steel, hardened and nicely ground on the four sides.

THEY SHOULD BE PURCHASED ONLY IN PAIRS.

As shown by the cuts, they are numbered on the ends in pairs and their relative accuracy is held to extremely close limits. Made in 6 inch length only.

THEY ARE NOT MADE TO BE USED AS SQUARES.

Catalog No.	Thickness Inches	Width Inches	Price Per Pair
384A	1/4	1	\$6.00
384B	3/8	1 1/4	6.00
384C	1/2	1 1/2	6.00
384D	3/4	1 3/4	6.00
384E	1	2	7.00
384F	1 1/4	2 1/4	7.00
384G	1 1/2	2 1/2	7.00
384H	2	3	7.00

Set No. 1—4 pairs, consisting of sizes A, C, E and G..... \$26.00

Set No. 2—4 pairs, consisting of sizes B, D, F and H..... 26.00

Each size one pair in a box. One set in a box.

NOTE: Prices for sizes other than listed quoted on application.

Hold Downs No. 54



Hold downs are used to hold work down flat as on a machine platen or in a vise where a small amount is removed from a surface, etc., and where other methods of clamping are inconvenient. Work can be securely held without distortion. The contact edges are slightly tapered so as to force the base of the work to the bed of the machine. These hold downs are made of tool steel, hardened and ground.

PRICES

			Per Pair
No. 54A	4 inches long by	$\frac{35}{64}$ inch wide	\$1.50
No. 54B	5 " " "	$\frac{27}{32}$ " "	2.00
No. 54C	6 " " "	$\frac{27}{32}$ " "	2.75

Packed 1 pair in a box

Adjustable Parallels No. 154

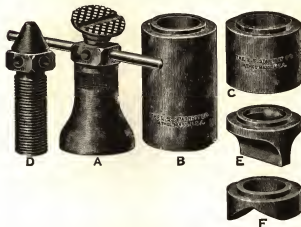


These parallels will be found very convenient for use in connection with milling, planer and shaper vises, taking the place of the large number usually required, also, for leveling up work on a planer, drill press, etc. They will be found valuable as a support for grinding or milling of square or hexagonal stock on centers, as they may be adjusted and locked to micrometer measurements from $\frac{3}{8}$ inch to $2\frac{1}{4}$ inches.

	Length	Thickness	Capacity	Price each
No. 154A	$1\frac{1}{2}$ inches	$\frac{1}{8}$ inch	From $\frac{3}{8}$ inch to $\frac{1}{2}$ inch	\$0.90
No. 154B	$2\frac{1}{2}$ "	$\frac{1}{8}$ "	" " " " $\frac{11}{16}$ "	1.10
No. 154C	$2\frac{1}{2}$ "	$\frac{1}{8}$ "	" " " " $\frac{13}{16}$ "	1.20
No. 154D	$3\frac{1}{2}$ "	$\frac{1}{8}$ "	" " " " $\frac{13}{16}$ inches	1.50
No. 154E	$4\frac{1}{2}$ "	$\frac{1}{8}$ "	" " " " $1\frac{1}{4}$ inches	1.80
No. 154F	$5\frac{1}{2}$ "	$\frac{1}{8}$ "	" " " " $2\frac{1}{4}$ "	2.10

Packed 2 in a box.

Little Giant Jack Screws No. 190 and No. 191



These are designed for tool-room use, for leveling up work on a planer-bed or under an upright drill, setting up machinery, etc. All parts are case-hardened.

No. 190 The Jack (A) is $1\frac{1}{4}$ inches diameter at the base and has a range from $2\frac{1}{4}$ to $3\frac{1}{4}$ inches. It will raise 1,000 pounds or more. Two extension bases (B and C) are made to fit the base of the main part (A) and are 2 inches and 1 inch high respectively. With these two extensions used singly or together a reach from $2\frac{1}{4}$ to $6\frac{1}{4}$ inches may be obtained.

An auxiliary pointed screw (D) is supplied to be used in place of the screw with swivel cap in certain places where it may be preferable. Very often at the point where the jack screw must be placed base (B) cannot be used. For use in such instances the base (E) is provided. The extension V base (F) is for use against a cylindrical form and is often used to straighten motorcycle frames.

No. 191 A smaller size is made with the same number of parts but 1 inch diameter. Part A, $1\frac{1}{2}$ inches high; B, 1 inch, and C, $\frac{1}{2}$ inch. With this size, adjustments from $1\frac{1}{2}$ to $3\frac{1}{2}$ inches are obtainable.

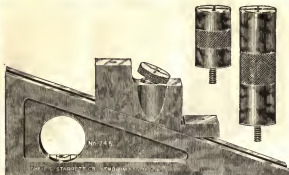
PRICES

(For either the No. 190 or No. 191)

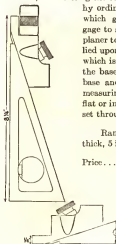
Jack (A).....	\$0.90
Extension Base (B).....	.25
Extension Base (C).....	.20
Extension Base (E).....	.25
Extra Screw (D).....	.20
Extension V Base (F).....	.20
Jack, with all Attachments.....	2.00

Sent complete unless otherwise ordered.

Planer and Shaper Gage No. 246



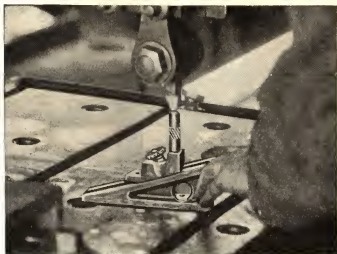
The time taken by a planer or shaper-hand in adjusting the depth of the first cut, or in setting the tools for any required cut has been found to be so great by ordinary methods that we have designed this special gage, which greatly facilitates these operations. By setting this gage to a micrometer, surface gage, or caliper and bringing the planer tool in contact with it, the first cut may be absolutely relied upon. This reduces to a minimum the cut and try method which is common in shops not having this gage. The level in the base of the gage is an appreciable feature in itself. The base and slide are steel forgings and are heat treated. All measuring surfaces are nicely ground. With the gage lying flat or in an upright position, all sorts of dimensions are readily set through the combination of parts shown in the illustration.



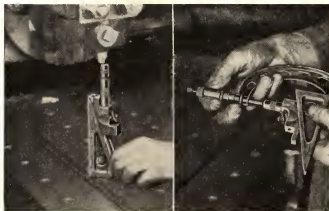
Range $\frac{1}{4}$ inch to $8\frac{3}{4}$ inches. Base dimensions:— $\frac{3}{8}$ inch thick, 5 inches long.

Price.....\$5.00

Packed 1 in a box.



Accurate setting to the cutting tool



Range of settings from $\frac{1}{4}$ inch
to $8\frac{1}{4}$ inches in height

Easily set to a micrometer

Showing our No. 246 in use

Toolmakers' Parallel Clamps No. 161



These clamps are made of steel, case-hardened, and are very useful for holding small work together, in tapping, drilling, etc. When ordering jaws only, state length desired. Specify the jaw with tapped holes as No. 1 jaw, and the plain jaw as No. 2 jaw. When ordering screws only, specify the full threaded screw as "B" screw, and screw with smooth end as "C" screw, as shown in cut. The "loose" jaw is held tightly by a spring attachment, thereby preventing its riding while opening or closing the clamp.

	Length of Jaws	PRICES	
		Opening	Per Pair (2 Clamps)
No. 161 AA	1½ inch	¾ inch	\$1.40
No. 161 A	2 "	1¼ "	1.70
No. 161 B	2½ "	1¾ "	2.00
No. 161 C	3 "	2¼ "	2.40
No. 161 D	4 "	2¾ "	3.00
*No. 161 E	5 "	3½ "	4.60

Packed 1 pair in a box.

*Indicates New Size.



No. 1



No. 2



No. 2—jaw showing spring clamp attachment



B



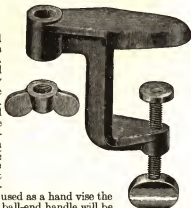
C

Combination Hand Vise No. 86

Patented



This hand vise furnished with a clamp, permitting its use as a small bench vise, is a tool, the utility of which will readily be recognized by mechanics as well as those working around the home. By removing the handle and substituting the clamp, the tool may be fastened to benches, shelves, etc., having an approximate thickness of $\frac{1}{2}$ inch to $2\frac{1}{8}$ inches. The vise can be adjusted to different positions to meet the convenience of the user. When used as a hand vise the leverage obtainable with the ball-end handle will be



No. 86

APPLIED TO BENCH

appreciated in comparison with a wing nut so commonly employed for this purpose. The jaws are made from forgings and are properly tempered. Width of jaws $1\frac{1}{2}$ inches. Capacity about $1\frac{1}{2}$ inches. Length about 7 inches.

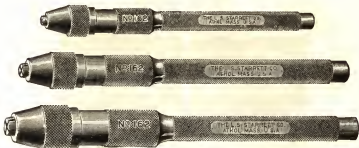
PRICES

No. 86 A	Hand Vise with Clamp as shown.....	\$5.00
No. 86 B	Hand vise only.....	4.00

No. 86 A sent unless otherwise ordered.

Packed 1 in a box.

Pin Vises No. 162



These vises have hardened jaws with chucks so made that they will hold firmly anything inserted in them. The hole extends through full length of the knurled handle. The handle is reduced in size, so that it may be more rapidly rotated between thumb and finger when filing small work. They are convenient handles for holding scribers, small files, taps and extensions for holding small drills. Nickel plated.

	Capacity	Prices
No. 162 A 0 to .040 inch		\$0.65
No. 162 B .030 inch " .062 "		.65
No. 162 C .050 " " .125 "		.65
No. 162 D .115 " " .187 "		.80
Set complete (one of each size)		2.75

Each size packed 6 in a box.

Pin Vises No. 166

With Rubber Handle. Octagon Shape



These pin vises are the same as our No. 162, described above, except that they are made with a hard rubber handle which is octagon in shape, thereby making them less apt to roll when laid down.

	Capacity	Prices
No. 166 A 0 to .040 inch		\$0.75
No. 166 B .030 inch " .062 "		.75
No. 166 C .050 " " .125 "		.75
No. 166 D .115 " " .187 "		.90
Set complete (one of each size)		3.15

Each size packed 6 in a box.

V Blocks and Clamp No. 268



These drill blocks and clamps are of cast iron material, sufficiently strong to stand any work they may be subjected to. The blocks are $1\frac{1}{2}$ inches square and 2 inches long, and are furnished in pairs.

The clamp will hold a round piece up to $1\frac{1}{4}$ inches diameter firmly in the groove of the blocks, for prick punching, drilling or laying out a series of holes before and while being drilled.



PRICES

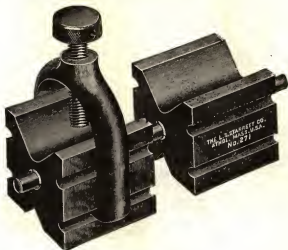
No. 268 A	Two Drill Blocks.....	\$1.25
No. 268 B	Clamp.....	.60
No. 268 C	Set complete.....	1.85

No. 268 C sent unless otherwise ordered.

Steel V Blocks and Clamp

No. 271

Case Hardened



These blocks are designed to be used singly or in pairs in connection with drill presses and for laying out work, prick punching, etc. The blocks may be used close together or separated, and are kept in line by a spindle 6 inches long passing through friction bushings. They will be found convenient when holding pieces with shoulders, which may rest between the blocks. The blocks are $1\frac{1}{4}$ inches square and will hold round pieces to $1\frac{1}{4}$ inch diameter. The two grooves in each side take up the length and hold the clamp for small or large work. The clamp, sometimes called the yoke, is a steel forging finished all over and case-hardened. The V's as in most V blocks, are 90° , measuring about $\frac{1}{8}$ inch and $\frac{1}{4}$ inch respectively across the mouth of the V.

PRICES

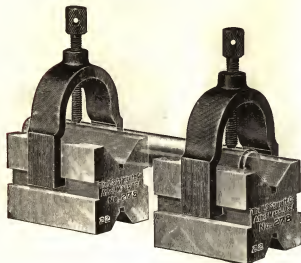
No. 271 A	Two Drill Blocks.....	\$2.40
No. 271 B	Clamp.....	.90
No. 271 C	Set, complete.....	3.30

No. 271 C sent unless otherwise ordered

V Blocks and Clamps

No. 278

Hardened and Ground



The drill blocks shown on this page are designed to meet the demands for an accurate set of V blocks to be used in connection with the surface plate, angle-iron, etc. Milling or grinding work clamped in the V's of this tool will be held fast and true.

The blocks are made of tool steel and are hardened and ground throughout. The V's are ground central, parallel and square with the ends and sides. The blocks are numbered in pairs so that the V's in each block are always in alignment. Each block is about $1\frac{1}{4}$ inches square, $1\frac{5}{8}$ inches long, and has a clamping capacity of 1 inch in diameter.

PRICE

No. 278 Comprising two Drill Blocks and two Clamps \$6.75

Sold only in pairs.

Packed 1 set in a box.

Adjustable Jaw Cut-Nippers

No. 1



The majority of wire cutters or nippers once dull or broken are useless. The jaws of these nippers are detachable, so that they can be removed, re-ground and adjusted when they have become worn. Each jaw can be ground away to the extent of $\frac{1}{4}$ inch, remaining as good as new for practical use; and when used up, if ever, new jaws can be procured.

A screw through the jaw engages with a spline in the frame and draws the jaw firmly down to the toothed seat, holding it securely.

The adjustable screw and stud inside the handles permit setting the jaws so that the cutting edges will not be forced unnecessarily together. The construction of these cut-nippers furnish an abundant leverage.

Another improved feature in this cut-nipper is a flat spring below the cutting edges and over the joint, forming a yielding seat for the end of the wire to press against while being cut. This obviates the danger of breaking the jaws—as often happens with other styles of cut-nippers which allow the wire to be inserted against a solid surface, thereby creating a pushing out strain on the jaws when they are forced.

The head and handles are of drop forged steel, finely finished. All the parts are case hardened, except the jaws. These are made from a high grade of steel, nicely tempered. Those warranted to cut music wire have their cutting edges ground to a short, steep bevel, while those for common use have their cutting edges ground more acute, work easier, and are preferable for cutting softer wire or for general use. We particularly recommend this wire cutter to piano men, linemen, telephone men, and aeroplane workers, or in wire mills where constant cutting of wire is demanded. We also make jaws especially shaped for cutting wire in bicycle rims.

The $5\frac{1}{2}$ inch size is made with jaws held in place by one screw, whereas the 7 inch size is fitted with two screws.

PRICES

$5\frac{1}{2}$ inch, M (for music wire)	\$3.50
$5\frac{1}{2}$ inch, C (for common use)	3.50
$5\frac{1}{2}$ inch, B (for bicycle use)	3.50
7 inch, either M, C, or B	4.50
Extra jaws, either M, C, or B, which should be designated as above, per pair .....	.60
Screws for jaws, per dozen .....	.30
Splines for jaws, per dozen .....	.30



Cut-Nippers with M jaws sent unless otherwise ordered.

Packed 1 in a box.



Tile Cut-Nippers No. 235

These nippers are the same as our No. 1 except that the frames are cut out to allow the jaws to be adjusted for wide opening as shown in cut, thus fitting them to be used in cutting tile, for which purpose they are highly recommended by many tile workers who are now using them. The jaws can be easily replaced when necessary. These nippers are made in two sizes, 5½ inch and 7 inch.

PRICES

5½ inch.....	\$3.50
7 ".....	4.50

Packed 1 in a box.

Cut-Nipper No. 437

For Bicycle Spokes, Etc.

This cut-nipper combines great power with rigidity. Wire can be cut at extreme end of jaws. Cutting jaws conform to inside of bicycle rim and will cut off spokes as close as required.

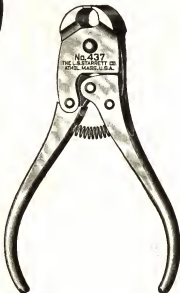
In case a jaw breaks it may be replaced.

Nippers open 3/32 inch.
Length of nippers over all 5½ inches.

PRICES

No. 437 Cut-nippers.....	\$4.00
Jaws, per pair.....	2.00

Packed 1 in a box.



Cut-Pliers No. 276



COMBINATION ROUND AND FLAT NOSE PLIERS. CIRCULAR ROTATING WIRE CUTTERS WITH SHARP EDGES, WITH SLIGHT FLAT ON BACK OF JAWS FOR LIGHT HAMMERING.

A particularly handy tool for anyone to use under almost any condition. As the cut shows, this tool permits the use of a round or flat nose plier, circular rotating wire cutters affording long use before replacement is necessary, slight flats on back of each jaw for light hammering, checked jaws and an abundant leverage. It will be found especially useful for electric wiring, piano tuning, and to complete the kit of tools carried by the autoist, and in the household.

Points and cutters may be replaced.

Particularly useful for Radio and Model Airplane Work

PRICE

No. 276 Cut-plier \$3.00

EXTRA PARTS

Round points, each..... \$0.20

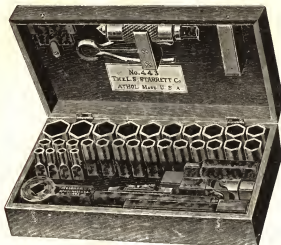
Flat points, each..... .30

Cutters, per pair..... .50

Packed 1 in a box.

Ratchet Wrench No. 443

**For Engineers, Machinists, Automobilists, and Motor
Mechanics**



In places difficult of access or in cramped quarters where a swing through a long arc is impossible, the ordinary monkey or S wrench is out of the question. Some other means of turning nuts and bolts is required. To meet these conditions we have invented and perfected the Starrett Ratchet Wrench. It consists of a ratchet with reversible pawl and a long wrench handle. With this wrench we furnish an extension to reach into otherwise inaccessible places; also a universal joint for turning nuts or bolts when it is impossible to get the wrench on at right angles to the ends of the bolt; a spark plug socket for use on automobile and aeroplane engines; a drilling attachment which takes standard square shank drills from $\frac{1}{8}$ of an inch to $\frac{3}{8}$ inch diameter, and a screw driver with reversible end; together with several adjustments to go with the drilling attachment.

This ratchet wrench is of particular value to engineers and chauffeurs who have to work about machinery crowded into small space or around hot engines. The sockets for the wrench will turn nearly any standard hexagon nut or bolt. With this wrench finished surfaces and corners of nuts need not be marred by taking it off and replacing at every fraction of a turn.

PRICES

No. 443 A Complete	\$15.00
No. 443 B Without Drill Fixture	13.00
Sent complete unless otherwise ordered.	

Parts of Ratchet Wrench

No. 443

The 27 small engravings around the outside represent the hexagon steel sockets, varying in size by 32nds, from 5/16 inch to 1 inch, also 1 1/32, 1 3/32, 1 5/32 and 1 9/32 inches. The set also has two square steel sockets, one each 13/32 inch and 21/32 inch.

PRICES OF PARTS

C	Ratchet Wrench, with reversible pawl.....	\$4.00
D	Extension to fit part C. The large end takes all standard sockets.....	.90
E	Spark plug socket.....	.40
F	Universal joint. May be used in connection with wrench and sockets, or with extension, screw driver, etc., thus giving several combinations. Very useful for getting at nuts or screws in otherwise inaccessible places.....	1.80
G	Screw driver. Used with extension if long blade is required, or in square part of any socket for cramped places. May be used with ratchet, or long socket alone thus obtaining a good sized handle.....	.50
H	Drilling attachment—Holds standard square shank drills 1/2 inch to 3/4 inch.....	2.60
I	Holder or friction wrench for drilling attachment.....	.30
J	Thrust plug—for use on all sockets and extension, protecting the hand when forcing down on the ends.....	.30
L	Drift pin.....	.15
M	Thrust plate for drilling attachment.....	.20
	Sockets, all sizes except spark plug, each.....	.25

No. 443K Attachment to be used with bit brace in connection with ratchet wrench sockets, extra..... \$0.90



Improved Scriber No. 67



This scriber is made for mechanics who want a better one than of ordinary wire. These points are made of a fine grade of steel, tempered and nicely finished. The knurled stock is of sufficient size to be easily held without cramping or turning in the fingers. The long, bent point will be found a valuable auxiliary for reaching through holes, etc. Length, with short, bent point, 9 inches; with long point, 12 inches. All parts are interchangeable. The knurled sleeve is nicked.

PRICES

Complete, as shown in cut.....	\$0.60
Without long point.....	.45
Sent complete unless otherwise ordered.	

EXTRA POINTS

Straight point.....	\$0.15
Short bent point.....	.15
Long bent point.....	.20

Adjustable Sleeve Scriber No. 68



The knurled sleeve has a hole clear through and a clamping device at one end, adapting it for slipping on or off different tools, securely holding them near to or away from the working point. The knurled sleeve is nicked.

This scriber is made in two lengths, 8 inches and 12 inches. Tool makers will find the small size more desirable for general use, and the larger one for heavier work. For pattern makers a knife scriber, made of a fine grade of steel, is supplied as an auxiliary.

PRICES

Either size, without knife point.....	\$0.60
Knife point, extra.....	.20
Extra scriber point.....	.20

The 8 inch, being the more popular size, will be sent (without knife point) unless otherwise ordered.

Above numbers packed 6 in a box.

Pocket Scribes

No. 70



This tool is made from steel tubing, knurled and nickel plated. The scriber is made from the best quality of steel, nicely tempered, and is held by a knurled chuck. The scriber is reversible, telescoping into the stock, and is held by a slight turn of the chuck so that it is always as safe to carry in the pocket as a pen-knife. The hexagon head prevents rolling off the bench.

Mechanics find this a convenient tool to have in their possession.

PRICES

No. 70A	Handle $\frac{1}{4}$ in. diam., blade $2\frac{1}{4}$ in. long, weight 1 oz.....	\$0.35
No. 70B	Handle $\frac{3}{8}$ in. diam., blade $2\frac{1}{8}$ in. long, weight $1\frac{1}{2}$ oz.....	.50

Packed 6 in a box.

Sole Gage

No. 273



This gage is especially adapted to the needs of shoe manufacturers. It is made of steel, nicely finished, graduated to show the thickness of soles and taps in 48ths of an inch, and is figured to show "irons" and "half-irons" from 2 to 12 inclusive. It is used to determine the thickness or weight of soles, taps, etc.

Price \$2.40

Packed 1 in a box.

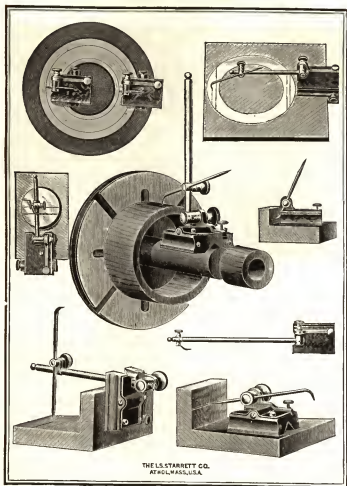
Surface Gages



The laying out of work often includes the scribing of lines at a given height from some face of the work or the continuation of lines around the several surfaces. To do this work, an instrument called a surface gage has been devised for holding the scriber. This consists of a heavy base and pivoted upright to which is attached a scriber held by a clamp which may be turned through a complete revolution. By resting both the surface gage and the work upon a plane surface, usually a cast-iron surface plate, it is possible to set the point of the scriber at a given height, either by use of a scale or some other standard, and draw lines at this height on all faces of the work or on any number of pieces when duplicate parts are being made. Thus the height of a standard bearing may be transferred to the faces of any number of castings from which duplicate bearings are to be made.

It is necessary in some cases to prepare the surface of the work so that the line made by the scriber will be sufficiently clean cut to enable the workman to distinguish it quickly. This is done in the case of rough castings by chalking the surface and rubbing in with the finger. In the case of a highly finished surface some other method is necessary. The usual way is to use a solution containing copper sulphate and nitric acid in the proportions of one ounce of copper sulphide, four ounces of water, and a teaspoonful of acid. This solution gives a reddish-brown color against which the lines will show. In cases where the temper of the metal is not to be considered, heating it to a blue will give a satisfactory result.

The use of the surface gage is not confined to scribing on vertical surfaces only. It may be used on other surfaces or as a height gage as well where measurements of extreme accuracy are not considered. The bent end on the scriber permits lines to be drawn on horizontal surfaces while a groove in the base of the gage makes it possible to mark out desired distances from the radius of a circular piece.



Showing a few applications of our Surface Gages

Universal Surface Gages

No. 57

This gage has our latest improvements, which make it all that can be desired, possessing the following points of merit:

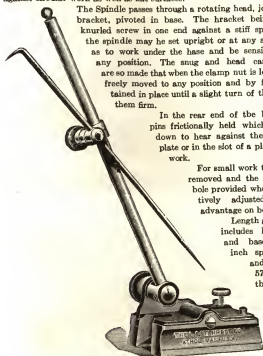
Heavy base, grooved through the bottom and end, adapting it for use on or against circular work as well as flat surfaces.

The Spindle passes through a rotating head, jointed to a rocking bracket, pivoted in base. The bracket being adjusted by a knurled screw in one end against a stiff spring in the other, the spindle may be set upright or at any angle, or turned so as to work under the base and be sensitively adjusted to any position. The snug and head carrying the scriber are so made that when the clamp nut is loosened, all may be freely moved to any position and by friction springs retained in place until a slight turn of the clamp nut holds them firm.

In the rear end of the base are two gage pins frictionally held which may be pushed down to bear against the edge of a surface plate or in the slot of a planer bed for linear work.

For small work the spindle may be removed and the scriber inserted in hole provided where it can be sensitively adjusted and used to advantage on bench work.

Length given for spindle includes height of spindle and base; except the 12-inch spindle with 57 B and the 18-inch with 57 D, the depth of the base not being included in the length of these two spindles.



PRICES

No. 57 A	3	inch base with	9 inch spindle	\$3.50
No. 57 B	3	" " "	9 and 12 inch spindles	4.00
No. 57 C	3 1/4	" " "	12 inch spindle	4.85
No. 57 D	3 3/4	" " "	12 and 18 inch spindles	5.50

Packed 1 in a box.

Starrett Universal Surface Gages



Starrett Gages are designed the way the most exacting machinists like them.

For example, the base has V grooves for use on or against circular as well as flat surfaces. It has frictionally positioned guide pins, is cut away on sides for good grip, and is properly weighted.

Fine adjustment through rocker in base, and has large knurled adjusting nut. The spindle and scribe can be set in any position.

Universal Surface Gages

No. 257

With Case-hardened Steel Base

This gage has our latest improvements, which make it all that can be desired, the following being points of special merit:

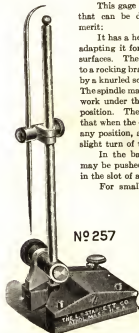
It has a heavy base, grooved through the bottom and end, adapting it for use on or against circular work as well as flat surfaces. The spindle passes through a rotating head, jointed to a rocking bracket, pivoted in base, the bracket being adjusted by a knurled screw in one end against a stiff spring in the other. The spindle may be set upright or at any angle, or turned so as to work under the base, and can be sensitively adjusted to any position. The snug and head carrying the scriber are so made that when the clamp nut is loosened all may be freely moved to any position, and by friction springs retained in place until a slight turn of the clamp nut hold them firmly.

In the base are four gage pins, frictionally held, which may be pushed to bear against the edge of a surface plate, or in the slot of a planer bed for linear work.

For small work the spindle may be removed and the scriber inserted in a hole provided for it, where it can be sensitively adjusted and used to advantage on bench work.

Special attention is called to the four gage pins in the corners of the base, which adapt it to be used as a locomotive guide liner and make it more convenient than other gages for many uses.

Length given for spindle includes height of spindle and base; except the 12-inch spindle with 257 B and the 18-inch with 257 D, the depth of the base not being included in the length of these two spindles.



No 257

PRICES

No. 257 A	3	inch base with	9 inch spindle.....	\$4.75
No. 257 B	3	" " "	9 and 12-inch spindles.....	5.25
No. 257 C	3 3/4	" " "	12 inch spindle.....	5.85
No. 257 D	3 3/4	" " "	12 and 18-inch spindles.....	6.50

Packed 1 in a box.

Toolmakers' Universal Surface Gage No. 56



This gage is admirably adapted for light work. The base is steel, nicely finished and case-hardened, with depressions in the sides for the thumb and finger. The top side is slotted, and the rocking bracket for fine adjustments is pivoted in same. There is a stiff spring under one end of the bracket and a knurled adjusting screw in the other; the spindle jointed to this may be set and rigidly held in any position from vertical to horizontal, and the scriber placed in position to be used below its base for depth gage, or (with bent end down) a scribing gage. A V-shaped groove in the end and the base adapts it for use on cylindrical work. There is a small hole in the clamp next to the base in which the scriber may be used for light work, the spindle being removed.

It weighs but ten ounces, and is five inches high, and when folding the spindle, which is four inches long, horizontally over the base, it may be packed in a $1\frac{1}{2} \times 1\frac{1}{2} \times 4$ inch space in the tool chest. An auxiliary guide made of steel and case-hardened as shown in cut, is furnished to clamp to the base for either a circular or straight edge. See page 246.

PRICES

No. 56A	With 4 inch spindle and auxiliary guide.....	\$4.10
No. 56B	Without auxiliary guide.....	3.50

Sent with guide unless otherwise ordered.

A 7 inch spindle is furnished when ordered at an extra cost of 30 cents.

Packed 1 in a box.

Surface Gages No. 52

This gage differs from our other surface gages as the spindle has only a vertical motion and the base is cut out to allow its being used as a depth gage.

The sleeve and needle clasp, when loosened for adjustment, are both held by a slight spring friction, and by a single knurled nut both are rigidly clamped. For fine adjustment, the spindle in the base is raised or lowered by a knurled nut, and all backlash is taken up by a spiral spring in the base.

For lengths greater than 12 inches, an extension is provided to couple onto the spindle.

PRICES

No. 52 A	8 inch	\$2.40
No. 52 B	12 "	3.30
No. 52 C	12 " with 6-inch extension	3.90
Sleeve only		.90

Packed 1 in a box.

Rule Holder No. 62

For Patternmakers and Machinists

Designed primarily for the pattern-maker and machinist to hold rules in an upright position for use in connection with surface gages, also for use as a depth gage. Its capacity ($\frac{3}{4}$ inch to $1\frac{1}{2}$ inches wide) permits the use of rules in general use, whether shrink, standard or combination square blades. A suitable nut of the right diameter insures firm retention of the rule.

The base is cast iron, proper consideration having been given to the important factor, weight, which is about $1\frac{1}{2}$ pounds. Grooves are cut on two sides for convenience in handling. Has combination of black enamel and bright finish.

Price \$1.85

Packed 1 in a box.



See page 22 for Shrink Rules.

Speed Indicators

In every factory in which machinery is used, the speed of the shafting and the machines themselves should be accurately determined in order to get from them the maximum service. The knowledge of this speed is also of great assistance in figuring the pulley sizes, etc. Engineers frequently have to compute the horse power which an engine or motor is giving out and this cannot be done without an accurate knowledge of the rotative speed. In order to determine these speeds with the greatest economy, an instrument should be used which will serve equally well for high or low speeds without beating on the high speeds and with perfect accuracy on the low. Our Speed Indicators are made in three different types for general purposes and for registering speeds. Each instrument is provided with three styles of tips, a pointed steel tip hardened and polished, which forms the end of the spindle, and two rubber tips, which may be slipped over the pointed metal tip, so that no matter what the shape of the point of contact, be it pointed, centered or otherwise, the revolutions per minute will be accurately recorded. These rubber tips not only remove the jar and run smoothly but produce a stronger frictional contact.

Surface Speed Attachment for Speed Indicators No. 109



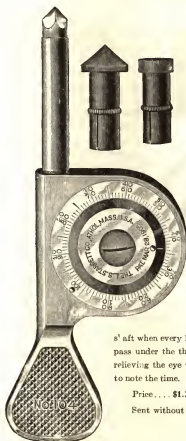
This attachment applied to any one of our speed indicators is designed to show the number of linear feet per minute the periphery or outside surface of a shaft or pulley is running and thus enable a workman to know if the speed is too fast or too slow to get the most work the tool will stand. For instance, the speed of a cone pulley being turned needs to be changed at every step. Heretofore it has been all guesswork as to the number of feet per minute the periphery of the work is traveling. It may be so fast as to beat and spoil the tool and cause expansion, burning the centers in lathes and milling machine arms, or it may not be nearly fast enough to perform what should be done. The same is true when shifting the tool from the hub to the rim of a pulley. The rubber-banded indicator wheel may be instantly slipped off or on the spindle of any of our speed indicators, and when held against the periphery of a shaft or pulley a half minute or a minute, by dividing the figures showing the revolutions on the dial of the indicator by 2, the number of feet the surface of the object traveling is obtained, as each revolution of the indicator wheel shows six inches; twice around, one foot. A close approach to accuracy is not claimed for this attachment, but it will be found very convenient and adequate for the purposes intended, as suggested above.

Price..... \$0.60

Packed 1 in a box.



High Speed Indicator No. 104



This indicator may be run at high speed without heating, and this on account of our frictionless bearing against which the inner end of the spindle revolves (a feature patented by us.)

The working parts of this instrument are encased, and the dial plate has two rows of figures, reading right or left, as the shaft may run.

An improvement in this indicator consists in the rotating disc, which, being carried by friction, may be moved to the starting point where the raised knobs coincide. When the spindle is placed in connection with the revolving shaft, pressing the raised knob with the thumb will prevent the disc from rotating, while the hand of the watch gets to the right position to take the time. By releasing the pressure the disc is liberated for counting the revolutions of the shaft when every 100 may be noted by feeling the knob pass under the thumb lightly pressed against it, thus relieving the eye which has only to look on the watch to note the time. This tool is nickel plated.

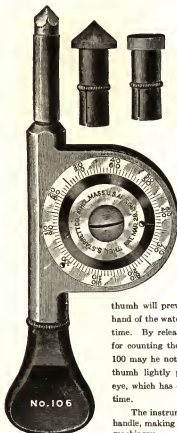
Price . . . \$1.25 With Leather case . . \$2.60

Sent without case unless otherwise ordered.

We supply this indicator with a spindle $7\frac{1}{4}$ inches long for use on Dairy Machines, etc., for 60 cents extra.

Packed 1 in a box.

Improved Speed Indicator No. 106



This is a nicely made and finely working indicator. The working parts are inclosed like a watch, and as well made. The graduations show every revolution, and with two rows of figures read both right and left as the shaft may run. While looking at the watch each hundred revolutions may be counted by allowing the raised knob on the revolving disc to pass under the thumb as the instrument is pressed to its work.

An improvement in this indicator consists in the rotating disc, which, being carried by friction, may be moved to the starting point where the raised knobs coincide. When the spindle is placed in connection with the revolving shaft, pressing the raised knob with the thumb will prevent the disc from rotating, while the hand of the watch gets to the right position to take the time. By releasing the pressure the disc is liberated for counting the revolutions of the shaft when every 100 may be noted by feeling the knob pass under the thumb lightly pressed against it, thus relieving the eye, which has only to look on the watch to note the time.

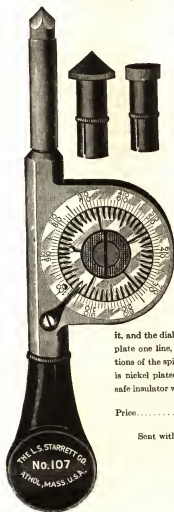
The instrument is nickel plated, and has a rubber handle, making a safe insulator when used on electrical machinery.

Price..... \$1.85 With Leather case... \$3.20

Sent without case unless otherwise ordered.

Packed 1 in a box.

Registering Speed Indicator No. 107



This instrument was devised to automatically register hundreds as well as units and tens, and thus relieve the mind from keeping tally; also to furnish a better registering indicator at a more reasonable cost than has been on the market heretofore. The instrument will register 5,000 revolutions. The large dial is graduated into one hundred lines, each one representing a revolution of the spindle. The small dial has fifty lines cut upon its face, each representing one hundred revolutions of the spindle (or one complete turn of the large dial). A spring finger trip attached to the case engages with one of the lines in the small dial and holds it from revolving until the large dial makes one complete turn, when the trip pin passing under the spring trip lifts

it, and the dial is frictionally carried along by the large plate one line, thus showing that one hundred revolutions of the spindle have been made. This instrument is nickel plated, has a hard rubber handle, making a safe insulator when used on electrical machinery.

Price..... \$3.60 With Leather case. \$5.10

Sent without case unless otherwise ordered.

Packed 1 in a box.

Toolmakers' Dividers

No. 277

With Round Legs



While nearly everyone is acquainted with the use of calipers and dividers, it may be stated briefly that in general, calipers are used for measuring distances between or over surfaces, or for comparing distances or sizes with standards, such as those on graduated rules. Dividers are for measuring distances between points, for transferring distances taken direct from a scale, and for scribing circles or arcs.

To those who are not familiar with the use of calipers, a word of caution may not be out of place. Calipers should never be used on work while it is revolving in a lathe or in any other machine, because if one contact of the caliper is placed against the work the other is likely to be drawn over the work by the friction of the moving surfaces. Only slight force is necessary to spring the legs of a caliper so that measurements taken from moving pieces are never accurate—frequently they are very misleading.

The cuts on this and the following page represent a line of Calipers and Dividers made from round stock with legs drawn down, making them tough and rigid. The fulcrum stud is hardened, bows extra strong, screw and nut nicely fitted, all highly finished and are the best tools in their line. They are made with solid nut only.

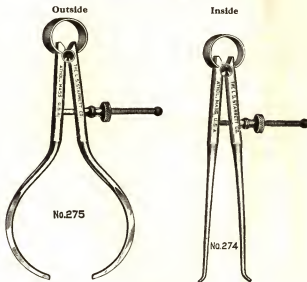
PRICES

2 inch.....	\$1.20
3 ".....	1.50
4 ".....	1.80
5 ".....	1.80
6 ".....	2.10

Packed 2 in a box.

Toolmakers' Calipers No. 275 and No. 274

With Round Legs



Made with solid nut only.

PRICES No. 275 and No. 274

2 inch.....	\$1.20
3 ".....	1.50
4 ".....	1.80
5 ".....	1.80
6 ".....	2.10

Packed 2 in a box.

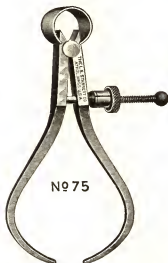
Duplicate Parts Toolmakers' Calipers and Dividers

PRICES

Screw and ball.....	\$0.20	Spring.....	\$0.30
Thumb attachment No. 277 only.....	.20	Jam washer.....	.15
Nut.....	.15	Fulcrum stud.....	.15
Leg (right).....	.40	Leg (left) with screw attached.....	.60

Fay Outside and Inside Calipers

No. 75 and No. 74



PRICES

OUTSIDE, No. 75

	Spring Nut	Solid Nut
2½ inch.....	\$1.40	\$1.20
3 ".....	1.40	1.20
4 ".....	1.50	1.35
5 ".....	1.50	1.35
6 ".....	1.80	1.65
8 ".....	2.10	1.95

INSIDE, No. 74

	Spring Nut	Solid Nut
2½ inch.....	\$1.40	\$1.20
3 ".....	1.40	1.20
4 ".....	1.50	1.35
5 ".....	1.50	1.35
6 ".....	1.80	1.65
8 ".....	2.10	1.95

Sent with Spring Nut unless otherwise ordered.

Packed 2 in a box.

Yankee Spring Dividers

No. 83



PRICES

2 3/4 inch, with solid nut	\$0.80	with spring nut	\$1.00
3	.85		1.05
4	.90		1.10
4 1/2	1.00		1.15
5	1.05		1.20
6	1.15		1.30
8	1.35		1.50
10	1.65		1.80
12	1.80		2.00

Sent with solid nut unless otherwise ordered.

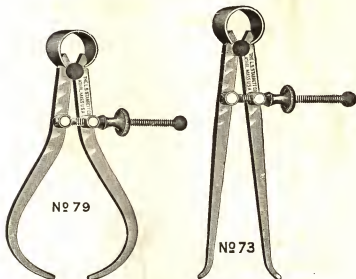
Packed 3 in a box.

Duplicate Parts of Yankee Calipers and Dividers

PRICES

Screw and Ball.....	\$0.20	Spring.....	\$0.30
Thumb Attachment (No. 83 only).....	.20	Jam washer.....	.15
Solid Nut.....	.15	Fulcrum Stud.....	.15
Spring Nut.....	.30	Stud.....	.15
Leg (right).....	.30	Leg (left) with screw attached.....	.50

Yankee Outside and Inside Calipers No. 79 and No. 73



The Yankee Calipers and Dividers are similar to the Fay pattern, are not quite so heavy as the Fay, and cost less. They are much liked, and on account of price are preferred by many to the higher cost tools.

All sizes are supplied with either solid or quick adjusting nut.

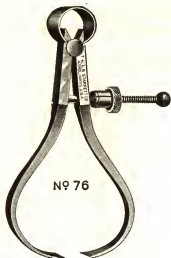
No. 73 represents our Yankee Inside Transfer Caliper with either spring or solid nut. The bow is stiff, making the caliper reliable. After calipering inside of chamfered cavity by springing in the legs they may be withdrawn, and as they spring back will show exact size calipered.

PRICES, No. 79 or No. 73

	with solid nut	with spring nut
2½ inch, with solid nut	\$0.80	\$1.00
3 " " " "	.85	1.05
4 " " " "	.90	1.10
5 " " " "	1.00	1.15
6 " " " "	1.05	1.20
8 " " " "	1.20	1.40
10 " " " "	1.65	1.80
12 " " " "	1.80	2.00

Sent with solid nut, unless otherwise ordered.

Packed 3 in a box.



No 76

Fay Thread Calipers No. 76

	PRICES	
	Spring Nut	Solid Nut
3 inch.....	\$1.40.....	\$1.20
4 ".....	1.50.....	1.35
5 ".....	1.50.....	1.35

Sent with spring nut unless
otherwise ordered.

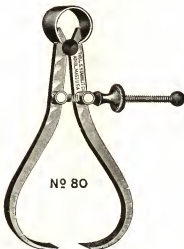
Packed 2 in a box.

Yankee Thread Calipers No. 80

	PRICES	
	Solid Nut	Spring Nut
3 inch.....	\$1.05.....	\$1.20
4 ".....	1.10.....	1.30
5 ".....	1.15.....	1.35

Sent with solid nut unless
otherwise ordered.

Packed 3 in a box.



No 80

Thread Calipers No. 184 and No. 179

These calipers are designed
for inside and outside measure-
ments of threads.

Inside

Outside

PRICES

No. 184 No. 179

Solid Nut Spring Nut

4 inch.....\$0.90.....\$1.10

5 " 1.00..... 1.15

6 " 1.05..... 1.20

Sent with solid nut unless
otherwise ordered.

Packed 3 in a box.

No 184

No 179

No 82

Keyhole Calipers No. 82

PRICES

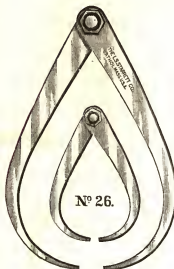
	Solid Nut	Spring Nut
3 inch.....	\$0.85	\$1.05
4 " .....	.90	1.10

Sent with solid nut unless otherwise
ordered.

Packed 3 in a box.

Improved Firm-Joint Calipers

No. 26 and No. 27



PRICES

3 inch.....	\$0.50
4 ".....	.60
5 ".....	.70
6 ".....	.80
8 ".....	1.00
10 ".....	1.10
12 ".....	1.20
14 ".....	1.80
16 ".....	2.10
18 ".....	2.55
20 ".....	3.00
24 ".....	3.60
30 ".....	No. 26 only 6.00
36 ".....	" " " 7.20

The No. 27 Inside Calipers are not made larger than 24 in.

The above sizes refer to the length of the calipers.

Their capacity is about one-third greater than the size given; for example, the 30 inch size will caliper 38 inches, and the 36 inch size will caliper 46 inches diameter.



The improvement in these calipers consists in the construction of the joint, which is so made as to be drawn together by means of a screw. The main stud is squared and fitted to one leg, thus preventing the stud from turning when loosening and tightening, and insuring a smooth and uniform friction of more or less tension to suit the user.

The quality of these calipers is incomparably superior to that of any old style riveted-joint caliper on the market.

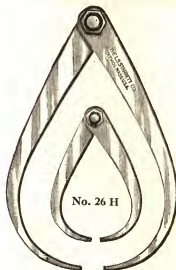
Sizes 3 in. to 12 in. packed 3 in a box.

Sizes 14 in. to 24 in. packed 2 in a box.

Sizes 30 in. and 36 in. packed 1 in a package.

Hardened Firm-Joint Calipers No. 26 H and No. 27 H

These calipers are same as our Nos. 26 and 27 except that they are hardened.



No. 26 H

PRICES

3 inch.....	\$0.60
4 " .....	.75
5 " .....	.80
6 " .....	.90
8 "	1.15
10 "	1.35
12 "	1.50

Above numbers
packed 3 in a box.



No. 27 H

Foundry and Forging Caliper No. 173

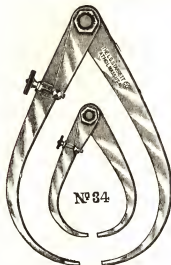


These calipers are well made, with firm joints and a long handle to caliper with comfort hot forgings—the long arm to be used for the greater and the short one for the smaller or finished size. The difference in the length of arms prevents using the wrong caliper when there is but slight variation in the work measured. The caliper is 22 inches in length over all and has a 6-inch caliper on one side and a 12-inch caliper on the other side.

Price.....\$2.50

Packed 2 in a box.

Perfected Firm-Joint Screw-Adjusting Calipers No. 34 and No. 35



The screw adjustment for fine measurements, the improved joint which may be set to any desired degree of uniform tension, the shape and stiffness of the legs, quickness and wide scope of adjustment,—all go to make this caliper a leader in its line.

PRICES

4 inch.....	\$1.10
6 ".....	1.20
8 ".....	1.50
10 ".....	1.80
12 ".....	2.10
14 ".....	2.40
16 ".....	2.70
18 ".....	3.00
20 ".....	3.30
24 ".....	4.20
30 " No. 34 only.....	7.20
36 " " ".....	8.40

The No. 35 Inside Calipers are not made larger than 24 in.

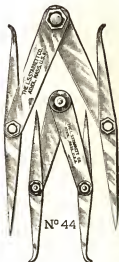
Sizes 4 in. to 12 in., packed 3 in a box.

Sizes 14 in. to 24 in., packed 2 in a box.

Sizes 30 in. and 36 in., packed 1 in a package.



Double Calipers No. 44



These instruments, as will be seen from the engraving, combine dividers, inside and outside calipers. They have our improved firm friction joints.

PRICES

6 inch	\$1.50
8 "	1.80

Packed 3 in a box.

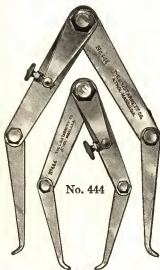
Calipers No. 444

These calipers may be used for inside or outside work. They have our improved firm friction joints and sensitive screw adjustment.

PRICES

6 inch	\$1.50
8 "	1.80

Packed 3 in a box.



Firm-Joint Hermaphrodite Caliper No. 41



These calipers have our adjustable point, as well as the improved firm-joint, which has made our No. 26 Outside and No. 27 Inside Calipers deservedly popular among mechanics. This joint, with its smooth and uniform friction, is incomparably superior to the old style riveted joint.

PRICES No. 41

4 inch.....	\$0.80
6 ".....	1.00
8 ".....	1.20
10 ".....	1.45

Packed 3 in a box.

Lock-Joint Hermaphrodite Caliper No. 42



Reverse

Front

With our adjustable point, lock-joint and sensitive adjustment. Reverse cut shows our adjustable point while the front cut shows our lock-joint and sensitive adjustment. The sensitive adjustment is obtained by the smaller knurled nut at lower end of arm.

PRICES No. 42

4 inch.....	\$1.20
6 ".....	1.40
8 ".....	1.65
10 ".....	1.95

Packed 3 in a box.

Hermaphrodite Calipers

No. 241 and No. 242



No. 241

The same as No. 41 except that both points are solid, neither being adjustable.

PRICES

3 inch.....	\$0.50
4 ".....	.60
5 ".....	.70
6 ".....	.80
8 ".....	1.00
10 ".....	1.10
12 ".....	1.20

Packed 3 in a box.



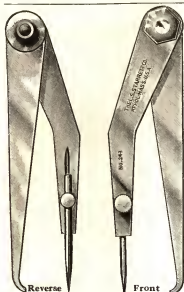
No. 242

The same as No. 42 except that both points are solid, neither being adjustable.

PRICES

4 inch.....	\$1.10
6 ".....	1.20
8 ".....	1.50
10 ".....	1.80

Packed 3 in a box.



Firm-Joint Hermaphrodite Calipers No. 243

These calipers are similar to our No. 41 Caliper shown on page 268, except that they are made with an offset leg which retains an adjustable round point. They are made only in the 4 and 6-inch sizes.

PRICES

4 inch.....	\$0.80
6 inch.....	1.00



Lock-Joint Dividers No. 43

With our improved lock-joint attachment and sensitive adjustment. It is light and rigid with large capacity, instantly opened, closed, and locked. The points are nicely tempered.

PRICES

6 inch.....	\$1.35
8 ".....	1.60
10 ".....	1.80

Firm-Joint Dividers No. 139

These dividers with our improved firm joint are made in 3 inch, 6 inch, and 12 inch lengths. They are rigid and the points are hardened and nicely finished.

PRICES

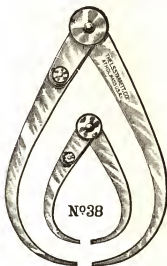
3 inch.....	\$0.55
6 ".....	.80
12 ".....	1.50

Above numbers packed 3 in a box.



Lock-Joint Calipers

No. 38 and No. 39



PRICES

4 inch.....	\$1.10
5 ".....	1.15
6 ".....	1.20
8 ".....	1.50
10 ".....	1.80
12 ".....	2.10
14 ".....	2.40
16 ".....	2.70
18 ".....	3.00
20 ".....	3.30
24 ".....	4.20



The above cuts represent a line of reliable lock-joint calipers of wide scope for both inside and outside work, that can be instantly adjusted to their full extent, and as quickly locked firm in the joint, and yet provided with a sensitive adjustment. The improvement consists in a socket joint made tapering and locked or released by a partial turn of the knurled disc. A spring washer under the disc maintains an easy friction in the joint when unlocked.

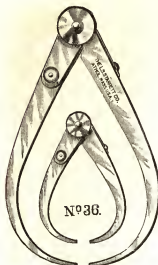
To further describe, in the under side of the short arm is a slot containing a stiff spring. Riveted into the middle leg and projecting through an opening in the arm is a threaded stud on which is a knurled nut having a beveled hub,—this bears against a cone in the arm,—the action of the spring holding them together turns the nut, forces them apart and adjusts the leg when the joint is locked. The spring takes up all backlash, and keeps the legs firm.

Sizes 4 in. to 12 in., packed 3 in a box.

Sizes 14 in. to 24 in., packed 2 in a box.

Lock-Joint Transfer Calipers

No. 36 and No. 37



PRICES	
4 inch.....	\$1.50
5 "	1.70
6 "	1.80
8 "	2.10
10 "	2.40
12 "	2.70
14 "	3.00
16 "	3.30
18 "	3.60
20 "	4.20
24 "	5.50

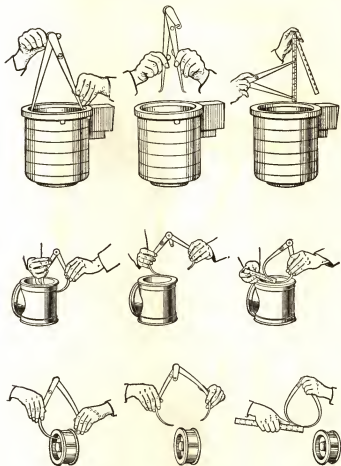


These calipers not only have all the excellent features of Nos. 38 and 39, as described on another page, but in addition to common use may be used inside of chambered cavities, over flanges, etc., (see page 273) removed and replaced without losing the size calipered. This is done by loosening the nut binding one arm to the auxiliary leaf and swinging it out or in (while the joint is locked) to clear the obstruction, then moving it back against a stop where it will show the exact size measured.

The sizes given refer to the length of the calipers, but the outside ones will caliper a cylinder 20 per cent greater than their length, and the inside calipers will open nearly twice their length. This applies also to Nos. 26 and 27, page 264, to Nos. 34 and 35, page 266, and to Nos. 38 and 39, page 271.

Sizes 4 in. to 12 in., packed 3 in a box.

Sizes 14 in. to 24 in., packed 2 in a box.

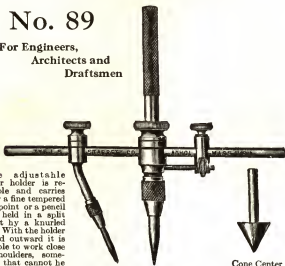


Illustrations showing our No. 36 and No. 37

Lock Joint Calipers

Universal Divider No. 89

For Engineers,
Architects and
Draftsmen



The adjustable scriber holder is reversible and carries either a fine tempered steel point or a pencil lead, held in a split socket by a knurled nut. With the holder turned outward it is possible to work close to shoulders, something that cannot be done by a similar tool of any other make; turned inward, points may be brought close together to scribe the smallest circle. With 4 in. beam a $7\frac{1}{2}$ in. circle and under may be scribed. An auxiliary beam 13 inches long is furnished, with which a 25 inch circle may be drawn. The cone center may be substituted for the regular point, adapting the tool for scribing around a drilled hole. We also furnish a pen attachment.

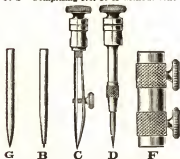
PRICES

- 89 A Tool with 4 in. beam and cone center, as shown above.....\$2.50
89 S Comprising No. 89 A without cone center and with 89 D .075 diam.

hole, in place of bent arm, also with 89 B in place of G..... 2.40

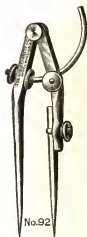
List of Attachments

- 89 B Needle Points each \$0.30
89 C Pen Attachment. 1.80
89 D Extra Straight Point and Socket..... .60
89 E Extra 13 in. beam to scribe 25 in. circle... .30
89 F Coupling..... .45
89 G Extra Steel Points each..... .15
89 H Tool and all attachments..... 6.00
Case for No. 89 A or S extra..... 1.50
Case for No. 89 H, extra.. 2.50



Note. The 89 D is supplied regularly with hole diameter .086, but may also be furnished when so desired with hole diameter .075 at the same price. No. 89 A without case, sent unless otherwise ordered. Packed one in a box.

Dividers No. 92



This cut shows a divider with features which make it the best divider in its line yet produced. Both points are crucible forged steel, nicely tempered. The quadrant passes through the leg and the clamp screw frictionally locks it firm. After fine adjustments are made, our style of lock nut, between the arms, locks the spring in the leg firm, overcoming the defect in the old style dividers of the points dodging out and in with the grain of the wood. The adjustable point may be instantly removed and a common pencil inserted in its place, or the ball points shown below may be used. The dividers are light, yet rigid and easy to handle, and are worth twice the price of the cheap malleable dividers on the market. The adjustable point is eccentric and may be loosened and rotated to make fine adjustments.

PRICES

6 in.	7 in.	8 in.	9 in.
\$1.45	\$1.55	\$1.65	\$1.75

Packed 2 in a box.

Ball Points No. 88

For use with No. 85, No. 90 or No. 92 Dividers
and No. 51, No. 58 and No. 59 Trammels

When it is necessary to use a hole as center for dividers or trammels it is, of course, impossible to use an ordinary divider point. In such cases the Ball Point placed in the hole and bearing against the edge forms a seat for the divider leg in scribbling circles or arcs around the hole. For very accurate work, however, the Ball Point is not recommended for it is impossible to keep it exactly in the center.

This set consists of four balls, $1\frac{1}{8}$ inches, 1 inch, $\frac{3}{4}$ inch and $\frac{1}{2}$ inch diameter, respectively.

In ordering this set for use with trammels, please give tool number of the trammel so that the proper holder may be sent.



PRICES

Complete, 4 Balls and Holder. . . . \$1.50

Balls or Holder only, each.30

Packed 1 set in a box.

Improved Extension Dividers

No. 85

This is a well finished divider, with auxiliary caliper legs, which, together with a common pencil, form convenient combinations. Our locking nut between the arms, against which a spiral spring acts, is a valuable feature. After the fine adjustment is made, the nut may be turned back, locking spring and arms firmly, thus remedying the weak point which renders the common wing divider only as stiff as the adjusting spring. A full-threaded nut on the stud through which the quadrant passes, is a more durable fastener than two or three threads tapped in the arm to hold the wing of the old style. The head and arms of this tool are made from the best malleable iron, the rest of steel. The points are hardened. The smallest size is 7 inches long; by adjustment of points it becomes 9 inches and will scribe a 22 inch circle; will caliper 11 inches outside and 13 inches inside. The second size is 9 inches; by adjustment of points it becomes 12 inches, and will scribe a 30 inch circle and caliper 14 inches outside and 16 inches inside.



The third size is 12 inches; by adjustment of points it becomes 14 inches, will scribe a 40 inch circle and caliper 17 inches outside and 19 inches inside.

The points are eccentric and may be loosened and rotated to make fine adjustments.

For Ball Points which may be used with this tool, see page 275.

PRICES

No. 85 A	7 inch, with divider legs only	\$1.80
No. 85 B	9 " " " " " "	2.10
No. 85 C	7 " complete	3.00
No. 85 D	9 " " "	3.30
No. 85 E	12 " with divider legs only	3.00
No. 85 F	12 " complete	4.20

No. 85 C sent unless otherwise ordered.

Packed 1 in a box

Improved Bronze Divider

No. 90

Nickel Plated



The head and socket legs of this tool are made from drawn (not cast) bronze metal, and are hard, tough, strong, finely finished and nickel plated.

The joint is large and firm. Our locking nut between the arms, against which a spiral spring acts, is a valuable feature. After the fine adjustment is made, the nut may be turned back, locking spring and arms firmly, thus remedying the weak point in the common wing divider, which is only as stiff as the adjusting spring. The quadrant is fastened by our improved method.

The points are eccentric and may be loosened and rotated to make fine adjustments.

A common pencil fits either socketed leg, while an auxiliary holder fits the reversed end of either short point for an extension. The head, with short point, is eight inches long; may be extended two inches or more; will caliper 10 inches outside and $12\frac{1}{2}$ inches inside. With short points it will scribe a 24-inch circle and with long points a 30-inch circle.

For Ball Points which may be used with this tool, see page 275.

PRICES

No. 90 A	With short points only.....	\$3.00
No. 90 B	Set complete.....	4.50

No. 90 B sent unless otherwise ordered.

Packed 1 in a box.

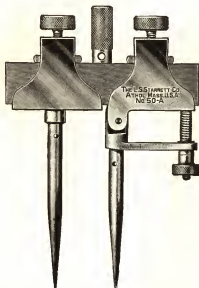
Extra Parts

Long Points, per pair.....	\$0.60
Outside or Inside Caliper Legs, per pair.....	.60
Auxiliary Pencil Holder.....	.50
Special Long Points (will scribe 44-inch circle) made to order.....	.75

Improved Trammel Points

No. 50

Nickel Plated



A trammel is a tool used to measure the distance between points too great to be reached with ordinary dividers.

These trammels are made of bronze metal, with forged steel points, hardened.

Either point can be removed, and the pencil socket accompanying each pair put in its place.

Adjustable like spring dividers. Light and durable.

The bar, shown in cut, holding pencil socket in center, with frames at each end, is similar to what would be used as a beam in using this tool, but is only long enough to permit easy packing in the tool chest, as well as in shipping.

PRICES

No. 50A	With 3 inch points, adjustable.....	\$3.50
No. 50B	" 3 " " not adjustable.....	2.25
No. 50C	Extra long points for above, 5 in., per set.....	.50

No. 50A sent unless otherwise ordered.

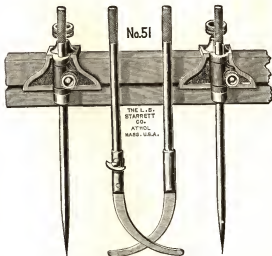
NOTE: When ordering No. 50C alone state whether they are to be used with No. 50A or No. 50B.

Packed 1 in a box.

Extension Beam Trammels

No. 51

Nickel Plated



The above cut represents a pair of Trammel Heads, with an opening through the under side to accommodate the extension, giving width and stiffness in proportion to the length required for large work, while it is equally well adapted to receive a narrow beam for light work.

The points are eccentric, and may be loosened and rotated in their sockets to make fine adjustments. Either point may be removed and a common pencil inserted.

One of the caliper legs is provided with a joint, worked by an eccentric thumb piece for fine adjustments.

The above cut merely shows a section of a beam these trammel heads would be used with. As it is much more convenient for a mechanic to fit the beam, we do not furnish same.

PRICES

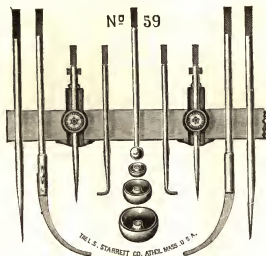
No. 51A	Complete.....	\$4.50
No. 51B	Without Caliper Legs.....	3.50

No. 51A sent unless otherwise ordered.

For Ball Points which may be used with this tool, see page 275.

Packed 1 in a box.

Trammels No. 59



This cut shows the trammels fastened to a wooden beam, which may be any size from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches wide, and of any thickness desired (requiring no fitting), giving stiffness according to the length and adapting it for small or large work.

The auxiliaries designed to go with the trammel heads are as shown above, viz., inside and outside caliper legs, an extra pair of long points, a set of four ball points with holder, which enable one to scribe a circle from the center of any hole up to $1\frac{1}{2}$ inches and under. A lead pencil may be used in place of either of the steel points. Our patent clamping device is adapted to take in either a small or common sized pencil. The trammels are furnished with or without auxiliaries.

The small engraving in the margin gives a more detailed representation of one of the heads. Due to the various lengths of beams required at different times and it being a simple matter for the mechanic to arrange, we do not furnish a beam.

PRICES

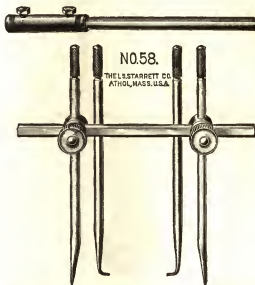
No. 59A	Trammel Heads (with one pair of points)	\$2.40
No. 59B	Balls and Holder, per set	1.50
No. 59C	Small Caliper Legs, per pair	.60
No. 59D	Large	1.00
No. 59E	Large Divider Points, per pair	.60
No. 59F	Set complete	5.75

No. 59 A sent unless otherwise ordered.

Packed 1 in a box.



Extension Steel Beam Trammels No. 58



The beam of this tool is $\frac{1}{8}$ inch round, with one side flattened, so constant clamping will not injure the sliding surface as well as keeping the points in alignment. It is made in one, two or three sections, of 14 inch lengths each, and coupled together by means of our improved socket coupling shown in cut, rigidly holding them for long reaches. A special wrench for the coupling screws is furnished with each tool. With one 14 inch section only, it weighs but 8 ounces. The slides carrying the points grip both beam and points by a partial turn of the knurled nut. Fine adjustments are made by a slight rotation of one or the other eccentric points, which by a friction spring retains them when the nut is loosened.

PRICES

		Plain	Nickel Plated
No. 58 A	With one Section, 14 inch.....	\$2.65	No. 58 D.....\$3.25
No. 58 B	" two " 28 ".....	3.15	No. 58 E.....3.85
No. 58 C	" three " 42 ".....	3.60	No. 58 F.....4.35
	Extra Sections, with coupling.....	.60	......75
	Caliper Points, as shown in cut, per pair..	.60	......75

Sent plain unless otherwise ordered.

For Ball Points which may be used with this tool, see page 275.

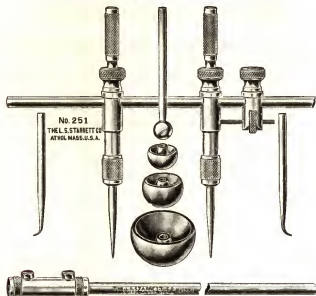
When Ball Points are to be used with No. 58 the fact should be mentioned in the order.

Packed 1 in a box.

Steel Beam Trammels

No. 251

For Draftsmen, Engineers and Metal-Workers



A rigid well designed trammel for laying out, scribing and measuring. The beam is flattened on the top so when the trams are clamped in position they cannot turn from pressure on the points. The trams are held in place by a spring friction once the nuts are loosened for setting. As will be observed from the cut, one tram has an adjusting screw for fine adjustment of the points.

At the top of each tram the knurled grips are in the form of a roller, the advantage being a swivel handle, which is far better than fixed handles. The points are adjustable in the spring chucks and can be replaced by pencils, caliper legs or ball points. The ball points permit working from holes up to $1\frac{1}{2}$ inches in diameter.

PRICES

No. 251A with $10\frac{1}{4}$ " beam, to scribe circle 18" in diameter.....	\$6.00
No. 251B with $14\frac{1}{2}$ " beam, to scribe circle 26" in diameter.....	6.00
No. 251C with 20 " beam, to scribe circle 36" in diameter.....	7.00

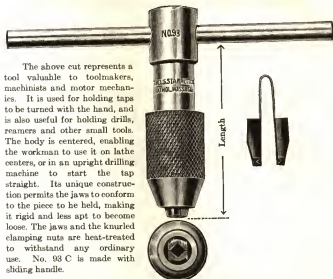
Pair Caliper Points included with above sizes.

No. 251D Coupling with extra 20" beam, to scribe circles 72" in diameter....	\$1.50
No. 251E Ball Points and Holder.....	1.50
No. 251F Extra Caliper Points per pair.....	.60

Set A sent unless otherwise ordered.

T-Handle Tap Wrenches

No. 93



The above cut represents a tool valuable to toolmakers, machinists and motor mechanics. It is used for holding taps to be turned with the hand, and is also useful for holding drills, reamers and other small tools. The body is centered, enabling the workman to use it on lathe centers, or in an upright drilling machine to start the tap straight. Its unique construction permits the jaws to conform to the piece to be held, making it rigid and less apt to become loose. The jaws and the knurled clamping nuts are heat-treated to withstand any ordinary use. No. 93 C is made with sliding handle.

The D, E and F listing are identical in capacity and construction to A, B and C except the body from knurled chuck nut to T-handle is proportionately longer. For machine, automobile service and airplane repair shops eliminating the expense of having on hand an endless lot of special long taps to work at depths where space doesn't permit of turning the handle.

PRICES

No. 93 A	Length	1 3/4 inches	Capacity	1/16 inch to 5/16 inch square	\$1.00
No. 93 B	"	2 1/8 "	"	3/16 " " 1/4 " "	1.25
No. 93 C	"	3 1/8 "	"	1/8 " " 1/2 " "	2.25
No. 93 D	"	6 "	"	1/8 " " 1/2 " "	1.75
No. 93 E	"	9 3/8 "	"	5/16 " " 3/4 " "	2.00
No. 93 F	"	12 3/4 "	"	1/2 " " 1/2 " "	3.00

Packed 1 in a box.

Tap Wrench No. 174



This wrench of nicely finished steel, with the gripping surfaces tempered will hold taps, reamers, drills, etc., or any tool $\frac{1}{4}$ inch in diameter or under. It will grip round, square or oval shanks. It being but 3 inches in length and light in weight makes it particularly valuable in using taps of small diameters.

Price.....\$0.60

Packed 6 in a box.

Tap Wrenches No. 91



This wrench is of new design, with gripping surfaces tempered—strong, neat and efficient. It will hold firmly a tap with square or round shank. Inside the knurled adjusting screw a spring connected with the plunger holds it back and causes instant movement with the screw.

PRICES

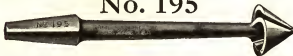
	Length	Holds Taps	Fits Squares	Approx. Weight	Price
No. 91 A	5 $\frac{3}{4}$ "	$\frac{1}{16}$ " to $\frac{1}{8}$ "	$\frac{3}{16}$ " to $\frac{1}{2}$ "	2 $\frac{1}{2}$ ozs.	\$0.90
No. 91 B	9 $\frac{1}{2}$ "	$\frac{1}{8}$ " to $\frac{1}{4}$ "	$\frac{1}{4}$ " to $\frac{3}{8}$ "	8 ozs.	1.80
*No. 91 C	12 $\frac{1}{2}$ "	$\frac{1}{4}$ " to $\frac{3}{8}$ "	$\frac{3}{8}$ " to $\frac{1}{2}$ "	1 lb.	3.50
*No. 91 D	16 $\frac{1}{4}$ "	$\frac{3}{8}$ " to $\frac{1}{2}$ "	$\frac{1}{2}$ " to $\frac{3}{4}$ "	2 lbs.	4.25

No. 91A—Packed 3 in a box.

Nos. 91 B-C-D—Packed 1 in a box.

*NEW—larger sizes.

Double-Lip Countersinks No. 195



This is the only double-lip, self-centering wood countersink that has a keen cutting edge, and the only one made on the true principle for a wood-working tool. It will clear itself of its shavings in any kind of wood and will cut a smooth, round hole, with surprising rapidity and ease. It is made from the best of steel, forged, twisted, and tempered. It can be sharpened from the inside with a file, and has a shank so that it may be held in bit braces or wood working chucks.

PRICES

No. 195 A	$\frac{5}{8}$ inch	\$0.60
No. 195 B	$\frac{3}{4}$ inch	.65

Packed 6 in a box.

Automatic Adjustable-Stroke Center Punches

No. 18

The ordinary hammer and center punch are not sufficiently accurate when laying out fine work. They require the use of both hands and the accuracy of the blow depends upon the skill of the mechanic.

This center punch contains a mechanism which automatically strikes a blow of any required force when the punch is in the exact position desired by the operator. It is provided with a knurled adjustable screw cap, which, working in connection with a spring, regulates the stroke. For work requiring a heavy mark, turn cap down; for work requiring a light mark, turn it up. To use it, no hammer is needed. The punch being placed in an upright position over the working line, a downward pressure releases the striking block and makes the impression without danger of slipping, as is liable when a hammer is used. When adjusted for either light or heavy stroke, all indentations are of a uniform size for the starting of the drill, etc., and more accurate and quicker work may be done as required on delicate work in tool making. The working parts are hardened, durable and accessible for such repairs as may ever be needed. The adjustable cap fits the hand, with no stroke adjusting screw through and above it to bother. The point can be removed for regrinding and easily replaced. The AA size is $3\frac{3}{4}$ inches long, when adjusted for medium stroke, $\frac{5}{8}$ inch diameter and weighs one ounce. The A size is 5 inches long when adjusted for a medium stroke, $\frac{5}{8}$ inch in diameter and weighs 3 ounces. The B size is 6 inches long when adjusted for a medium stroke, $\frac{5}{8}$ inch in diameter and weighs 4 ounces. It differs from the other sizes in being larger and capable of striking a much heavier blow.

PRICES

No. 18 AA.....	\$1.80
No. 18 A.....	2.40
No. 18 B.....	3.00
Extra points, each.....	.20

No. 18 A sent unless otherwise ordered.

Packed 1 in a box.

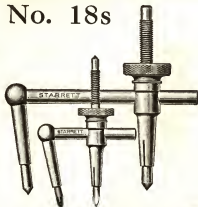


Spacing Attachment for Automatic Center Punches

No. 18s



Showing Attachment Applied to Center Punch



For use with automatic center punches No. 18. This attachment is entirely self-contained and can be instantly applied in place of the regular points. It will be found an indispensable tool for the rapid and accurate spacing of any center distances within its range. The locating point is on the principle of a spring plunger, held in its lowest position by a light spiral spring. It is frictionally held and easily replaced.

The attachment is made in two sizes: Size A has a capacity from $\frac{1}{8}$ in. to $\frac{3}{4}$ in. and fits either center punch No. 18AA or 18A. Size B has a capacity from $\frac{1}{8}$ in. to $1\frac{1}{4}$ in. and fits center punch No. 18B.

PRICES

No. 18S Size A.....	\$1.50
No. 18S Size B	1.50
Extra Points, each.....	.20

Packed 2 in a box.

Spacing Center Punch No. 118

This Combination Prick Punch and Spacing Tool is just the thing for laying off work quickly and accurately—for drilling, cutting out dies, etc. The prick punch is solid—made from best tool steel, properly tempered. The guide point is set in a socket with a spiral spring to force it down. When the punch is struck, the guide presses back into its socket, permitting the punch to be held straight over its work and insuring accurate results. The screw with pin plunger against spring retainer of adjustable point sets and holds the spacing right in laying out for small or large drill, and has a variation from $\frac{1}{4}$ inch to approximately $\frac{1}{2}$ inch.

Price

\$0.90

Packed 3 in a box.



No. 118

Spring Center Punch

No. 53

Patented

The unique construction of this punch brings it nearly in the automatic center punch class. While eliminating the use of the hammer it operates entirely different from the types heretofore available. Hold in position with one hand and with the other pull up the head and let go. The spring hammers the drive pin on the punch holder. By varying and repeating the "pull up" of the head, very small or large indentations are possible. All parts subject to wear are hardened and it is knurled for firm grip. The tip or point can be easily removed.

Price.....\$1.35

Extra points, each......20

Packed 3 in a box.

Center Punches

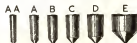
No. 117

Made to supply the demand for a better article than is ordinarily required. Made of fine steel, neatly shaped, knurled for finger grip, hardened and polished, and points nicely ground.

Length of Size AA—3½ inch. Length of sizes A-B-C-D, 4 inches. Diameter at top of tapered point, AA—1¼ inch, A—1¼ inch, B—1½ inch, C—1½ inch, D—1½ inch. Packed 12 in a box.

A larger size, E, is made for heavy work; length 5 inches, diameter 1½ inch, diameter of knurled part 1½ inch.

Packed 6 in a box.



PRICES

No. 117

Sizes AA-A-B-C-D, each.....	\$0.25
Sizes AA-A-B-C-D, per dozen.....	3.00
Size E, each.....	.30
Size E, per dozen.....	3.60
Assorted A-B-C-D in plain box, per dozen.....	3.00
Assorted A-B-C in round wooden box, as shown on page 292 per dozen.....	3.25
Sent assorted in plain box unless otherwise ordered.	



Center Punches No. 264

Patented

Square
With Knurled Grip
Will Not Roll



Diameter at Points

1/16" 5/64" 3/32" 1/8" 5/32" 3/16" 1/4"

The above cut shows our new distinctive line of center punches, square, with knurled grip. They will not roll when laid down. They are made in seven sizes ranging in length from 2 1/4 inches to 5 inches. The A, B and C sizes are specially adapted to light tool-makers' work. Each punch is tempered its full length.

PRICES

Sizes A, B, C and D, each.....	\$0.25	Per dozen \$3.00
Sizes E and F, each.....	.35	Per dozen 4.20
Size G, each.....	.40	Per dozen 4.80
Assorted A, B, C and D.....		Per dozen 3.00
Set of Seven (one of each size) in round wooden box, same as shown on page 289.....		2.30

All sizes packed 12 in a box, except G size, 6 in a box.

Drive Pin Punches

No. 565



Made of good quality steel, neatly shaped, hardened and polished, with knurled centers.

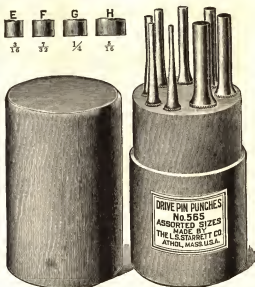
Length of each size, 4 inches. Diameter of points:—A $\frac{1}{16}$ inch, B $\frac{1}{8}$ inch, C $\frac{3}{16}$ inch, D $\frac{1}{4}$ inch, E $\frac{5}{16}$ inch, F $\frac{3}{8}$ inch, G $\frac{1}{2}$ inch, H $\frac{5}{8}$ inch.



PRICES

Set of Eight
(one of each size)
in round wooden
box as shown in
cut..... **\$1.80**
Per dozen in plain
box..... **\$2.40**
Each..... **.25**

Packed one
dozen of a size
except H, or one
dozen assorted
sizes in plain box.
Size H packed
one-half dozen in
plain box.

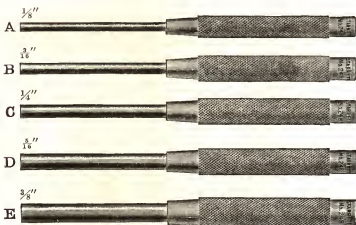


Drive Pin Punches

No. 248

Extra Long

For Motor Service and Machine Shop Work



These drive pin punches are 8 inches long and have a knurled grip of $4\frac{1}{2}$ inches. The pin drive part is $3\frac{1}{2}$ inches long, diameters of same being A- $\frac{1}{8}$ inch, B- $\frac{3}{16}$ inch, C- $\frac{1}{4}$ inch, D- $\frac{5}{16}$ inch and E- $\frac{3}{8}$ inch. The diameter of the knurled grips is $\frac{1}{16}$ inch on the A size, $\frac{1}{2}$ inch on the B, C, D sizes and $\frac{9}{16}$ inch on the E size.

They are designed to stand much hard use and to provide a more satisfactory punch for motor service and machine shop work. Just the punch to follow long cotter pins and the like into a hole without hindrance. Made of good quality steel and are hardened and polished.

PRICES

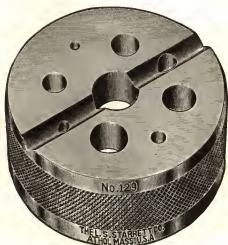
Sizes A, B, C, D, E, each.....	\$0.35.....	Per dozen	\$4.20
Sizes A, B, C, D, E,.....		Per dozen assorted	4.20
Set of 5 in plain box.....			1.75

Packed 6 in a box; assorted sizes 12 in a box.

Bench Block

No. 129

Patented



This block, like many other tools, was designed to meet the demand for something better than an ordinary piece of metal with a hole in it to drive pins in round or flat work. It is made from a forging and is hardened and ground. The knurling shown in the cut, while adding to its appearance, makes it easy to handle. The recess in the base as shown in the semi-sectional view decreases its weight, but it is strong enough to withstand much hard use. The V in the center is a feature needing no explanation. The holes vary in size from $\frac{1}{8}$ inch to $\frac{3}{8}$ inch. The block being about $1\frac{1}{2}$ inches

high and 3 inches in diameter, appeals to mechanics particular in preserving a finished piece of work where the fitting of dowel pins is necessary.



Semi-Sectional View

PRICE, \$2.50

Packed 1 in a box.

Nail Sets No. 116



Made of fine grade steel, both ends hardened and polished, centers nicely knurled, tips concaved, tops oval, and the size just right.
Length of each size 4 inches. Diameter at tip, A $\frac{1}{16}$ inch, B $\frac{1}{8}$ inch, C $\frac{1}{4}$ inch, D $\frac{1}{2}$ inch. Packed 12 in a box.

PRICES

Per dozen, in plain box	\$1.50
Each	.15
Per dozen, assorted A, B, and C, in round wooden box as shown	1.75

Sent assorted in plain box unless otherwise ordered.

Extra Heavy Nail Sets No. 176



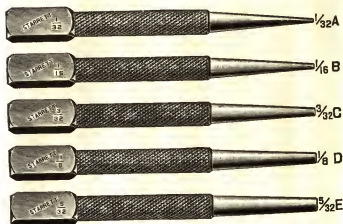
		Each	Per Doz.
No. 176 A	5 inches long, $\frac{3}{8}$ inch thick, $\frac{1}{8}$ inch at point	\$0.20	\$2.40
No. 176 B	5 " " " " " " " " " " " "	.25	3.00

Packed 6 in a box.

Square Head Nail Sets

No. 800

With Large Square Head and Round Grip



For the carpenter who likes a round grip and large striking surface. The square head prevents rolling and enables the user to readily pick it out from tools, nails, etc., in the pocket.

These nail sets are machined from $\frac{3}{8}$ inch square bar stock, cut 4 inches long, have deep knurling and the heads and points are polished. Size of point is stamped on each set.

Made in 5 point sizes, $\frac{1}{32}$ inch, $\frac{1}{16}$ inch, $\frac{3}{32}$ inch, $\frac{1}{8}$ inch, $\frac{5}{32}$ inch.

PRICES

Sizes A, B, C, D and E, each \$0.15 Per dozen \$1.75

Assorted, 2 A, 3 B, 3 C, 3 D, 1 E. \$1.75

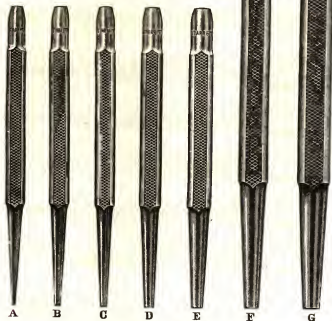
Sent assorted unless otherwise ordered.

Packed 1 dozen in a box.

Nail Sets No. 265

Patented

Square—With Knurled Grip—Will Not Roll



Diameter at Points

3/64" 1/16" 3/32" 1/8" 5/32" 3/16" 1/4"

The above cut shows our new distinctive line of nail sets, square with knurled grip. They will not roll when laid down. They are made in seven sizes, the length of the five smaller sizes being 4 inches, the two larger sizes 5 inches. Each set is tempered its full length and the points are nicely cupped and beveled. The A size is specially adapted for a brad set.

PRICES

Sizes A, B, C, D and E, each.....	\$0.25	Per dozen	\$3.00
Sizes F and G, each.....	.35	Per dozen	4.20
Assorted, A, B, C, D and E.....		Per dozen	3.00

Sizes A, B, C, D and E packed 12 in a box.

Sizes F and G, 6 in a box.

Combination Nail Holder and Set No. 119

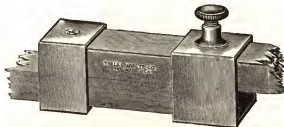


This cut shows our combination Nail Holder and Set. The nail may be instantly placed under the spring in the lower end of the holder and there retained by the pressure of same, ready to be driven home. After one blow is struck, the holder is withdrawn and the nail driven in and sunk with the punch—a great improvement over the difficult way of trying to hold a small nail between the thumb and finger at the risk of pounding them. The holder also admits of the nail being held to drive in places where the hand cannot go.

Price \$0.30

Packed 12 in a box.

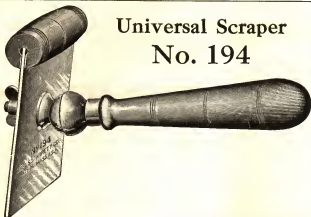
Measuring Bar Clamps No. 69



These clamps are one inch square inside, and are to be used with two wooden bars about 1 inch by $\frac{1}{2}$ inch, of any desired length. (We do not furnish the bars.) The clamps and bars thus combined will be found very convenient by carpenters as adjustable measuring rods, as well as for extension beams for our No. 59 Trammels. Nickel plated.

Price, per pair \$0.90

Packed 2 pairs in a box.



Universal Scraper No. 194

The edges of the blade are ground square. There are therefore eight sharp cutting edges, and any one of them can almost instantly be brought into use by means of the handle with its ball joint connection. The ball joint has a spring plunger, a feature appreciated in adjusting. The blade is approximately $2 \frac{15}{16}$ inches wide, $4 \frac{9}{16}$ inches long and .065 inch thick, while the handle is about 7 inches long.

To lock or release the joint, or place the blade at any angle, it is simply necessary to give the handle a slight turn. The wing nut is used when the blade is removed from the handle.

The guard may be instantly slipped on or off either side or end of the blade, and enables one to use the tool with a firm grip, bearing on heavily or lightly as may be desired.

It is the neatest, simplest and best all-around scraper on the market.

Price	\$1.25
Blades only, regular size, each .....	.25
2 inches wide, each .....	.25
Guards for blades, each .....	.20

Packed 1 in a box.

Burnisher No. 810

For Turning Scraper Cutting Edge



Although differing from the set standards for burnishers, many users of scrapers like this oval shape with the knurled steel handle. Gives a better grip and does away with the annoying looseness of a wood handle.

This burnisher is about 7 inches long; the approximate length of the oval section being 4 inches.

Possesses proper hardness and smooth polished surface.

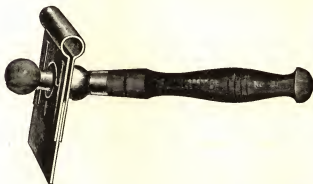
Price, each	\$0.45
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Packed 6 in a box.

Floor, Bench and Cabinet Scraper

No. 181

Patented



The head of this scraper is made of sheet steel with ribs struck up to make it rigid and has a bow formed for a rest to bear upon, which is nickel plated to a dull finish. The handle is connected to a universal joint allowing it to be set at an angle, enabling the user to get into corners without bruising the knuckles or bumping the hand against the wall. A turn of the handle locks it firmly. Both ball and handle are hard wood and stained. The blade is square and any of the sharp cutting edges, may be quickly placed for action and firmly clamped, seating itself against two studs in the head. The blade is approximately 3 inches square, and .065 inch thick and the handle is about 8½ inches long. In design, workmanship, material and finish this tool is strictly Starrett quality.

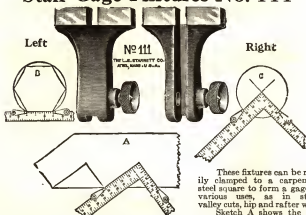
Price \$1.50

Extra Blades, each25

Note: For Burnisher to be used with this Scraper, see our No. 810 listed on page 296.

Packed 1 in a box.

Stair Gage Fixtures No. 111



These fixtures can be readily clamped to a carpenter's steel square to form a gage for various uses, as in stairs, valley cuts, hip and rafter work.

Sketch A shows the gage as applied for laying out a stair

stringer; sketch B, laying off hexagon angles; sketch C, as used as a center gage or in quartering a circle. Fixtures are light, neat, and efficient.

Price, per pair.....\$0.90

Packed 3 pair in a box.

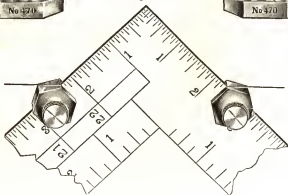
Stair Gage Fixtures No. 470



A small set of $\frac{3}{4}$ inch hexagonal fixtures for the carpenter's steel square. Can be quickly clamped in place on the blade, to lay out angles for stair stringers, sawing, etc.

The finish is white nickel. Set screws are brass with natural finish. Price per pair.....\$0.50

Packed 12 pair in a box.



Adjustable Stair Gages or "Fence"

No. 110 Nickel Plated



This gage is to be used in connection with any carpenter's steel square, and can be adjusted to any pitch or angle desired. For cutting in rafters, braces, stairs, etc., it will soon pay its cost and prove one of the most valuable tools in a carpenter's kit.

The attachment is furnished either plain or graduated in inches, 4ths, 12ths, and 24ths.

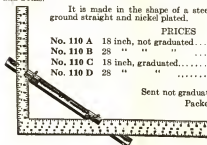
It is made in the shape of a steel angle, $\frac{1}{8} \times \frac{3}{8}$, $\frac{1}{8}$ inch thick, ground straight and nickel plated.

PRICES

No. 110 A	18 inch, not graduated.....	\$2.85
No. 110 B	28 " " " ".....	3.15
No. 110 C	18 inch, graduated.....	3.60
No. 110 D	28 " " " ".....	4.75

Sent not graduated unless otherwise ordered

Packed 1 in a package.



Screw Driver

No. 570

For Toolmakers and Machinists



An especially adaptable screw driver for tool-makers and machinists, but appealing to other tradesmen as well, there being three blades which will fit nearly all screw heads. The blade is clamped and is as rigidly held as the solid type by a knurled nut. The cut shows that the nut merely holds the blade in position, the tang being so constructed as to withstand the greatest leverage. The hexagonal hard wood handle makes it the best feeling screw driver on the market. It is a well finished tool throughout and with the blade inserted is about 10 inches in length.

Price, with three blades.....	\$2.00
Extra Blades, each.....	.25

Packed 1 in a box.

Jewelers' Screw Drivers No. 555



Cuts Full Size

They are nicely and substantially made from steel tubing, knurled and nickel plated. Six constitute a set, with blades varying from .025 inch to 1.00 inch in width. The blades are held from turning in the handle by a solid lock, and from coming out by a slight turn of a neat chuck. The top is finished with a swivel knob, concaved to fit the finger and hexagonal in shape to prevent rolling off the bench. To designate the size at a glance, the chuck end is marked with various grooves, five grooves indicating the finest size AA, four grooves size A, three grooves size B, two grooves size C, one groove size D; the largest size, E, being plain.

For prices see page 301.

Jewelers' Screw Drivers No. 555

No. 555AA	Handle	1/4 inch diameter, width of blade	.025 inch	.....	\$0.45
No. 555A	"	1/4 " " " " " "	.040 " " " " " "	.....	.45
No. 555B	"	1/4 " " " " " "	.055 " " " " " "	.....	.45
No. 555C	"	1/4 " " " " " "	.070 " " " " " "	.....	.45
No. 555D	"	1/4 " " " " " "	.080 " " " " " "	.....	.45
No. 555E	"	1/4 " " " " " "	.100 " " " " " "	.....	.45
Set of six	.....	\$2.70	Extra blades, each	.....	.15

Each size packed 6 in a box.

Opticians' Screw Driver and Holder No. 552



This screw driver is designed for those using small screws, especially opticians, watch and clock makers. When the screw holder is not needed it may be slipped back on the blade, out of the way.

PRICES

No. 552 A	Screw Driver, complete, with two blades and screw holder	.....	\$0.80
No. 552 B	Screw Driver with two blades, without screw holder	.....	.60
	Screw Holder, only	.....	.20
	Extra Blades, either size, each	.....	.15

No. 552 A sent unless otherwise ordered.

Packed 6 in a box.

Eye Glass Screw Drivers No. 554



This screw driver is made with a chuck to hold the blade firmly in a split socket when in use. To carry in the pocket, on key-ring or watch chain, the blade may be removed by slightly loosening the chuck, then reversed and telescoped through the socket nearly full length, and held safely by tightening the chuck.

Engraving actual size of tool. Nickel plated.

Price	.....	\$0.35
Extra blades, each	.....	.10

No. 556



Made in two pieces and screwed together, telescoping the blade when not in use. It is neat and safe to carry in the pocket, on key-ring or attached to a watch chain. Nickel plated.

The engraving shows the actual size of the screw driver.

Price	\$0.20
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Pocket Screw Drivers No. 553



This tool is made from steel tubing, knurled and nickel plated. The shank of the blade fits a solid lock in the tube, preventing it from turning, and is held from coming out by a slight turn of the chuck.

To carry in pocket, reverse the blade, inserting it in the handle, giving a slight turn of the chuck to keep it there. It takes no more room in the pocket than a penknife.

The blades are properly tempered.

PRICES

No. 553 A	Handle $\frac{1}{4}$ inch diameter, blade $1\frac{1}{4}$ inches long, weight $\frac{1}{2}$ oz....	\$0.40
No. 553 B	Handle $\frac{3}{8}$ inch diameter, blade 3 inches long, weight $1\frac{1}{4}$ oz....	.50
Extra blades, each.....		.15

Pocket Screw Drivers No. 559 With Wood Handles



These screw drivers are very similar to our No. 553 listed above, except that they are made with a good feeling wood handle. There are many small and inexpensive screw drivers on the market but these were designed for those who prefer a little better quality and strength thruout.

Steel parts are nickel plated. Blades reversible, telescoping in handle. Length with blade, A-4 inches; B-6 inches.

PRICES

No. 559 A	Handle $\frac{1}{4}$ inch diameter, blade $1\frac{1}{4}$ inches long, weight $\frac{1}{2}$ oz....	\$0.50
No. 559 B	Handle $\frac{3}{8}$ inch diameter, blade 3 inches long, weight $1\frac{1}{4}$ oz....	.65
Extra blades, each.....		.15

Above numbers packed 6 in a box.

Magazine Screw Driver No. 557

Patented

This is the best tool yet offered for a set of pocket screw drivers. It has four blades of different widths, any of which may quickly be taken from the telescope handle and inserted in the end, where it is automatically locked and firmly held for use. Any or all of the blades are carried in the handle, where by a spring pressure they are held from rattling when carried in the pocket, or from being lost when the cap is off. While the cap may be readily pulled off or put on, it is rigidly held from turning and frictionally held from coming off, with no screws to bind or bother.

The smaller blades may be used to make holes in wood, to start screws as well as to drive them home. This tool will be found valuable in every household as well as to the mechanic.

The widths of the blades are $\frac{1}{16}$ in., $\frac{1}{8}$ in., $\frac{1}{4}$ in. and $\frac{3}{8}$ in.

Price, complete.....\$1.65
Extra blades, each......15

Packed 1 in a box.

No. 557 No. 560



Electricians' Pocket Screw Driver

No. 560

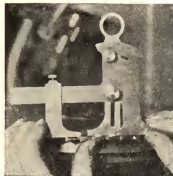
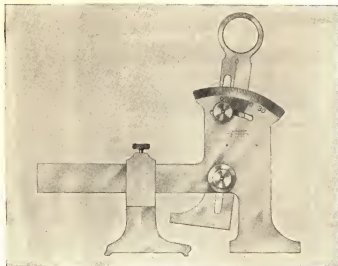
Patented

This screw driver is the same as our No. 557, except that the handle is covered with hard rubber for insulation from electrical currents, and is nicely ribbed so as to insure a firm grip when using the tool.

Price, complete.....\$2.00
Extra blades, each......15

Packed 1 in a box.

Cutter Clearance Gage No. 459



Gage Used on Side Teeth of
12" x $\frac{3}{16}$ " Saw.



Gage Used on Diameter of 20"
Dia. Inserted Tooth Mill.

See page 306 for additional illustrations of this gage in use.

Cutter Clearance Gage

No. 459

Patented

PROPER CUTTER CLEARANCE! Is there any phrase heard more in tool and machine shops the world over? There is no more important single factor in the successful operation of a milling cutter than **CORRECT CLEARANCE** back of the cutting edge.

Correct design, good steel, proper hardening, are factors established by the manufacturer and not subject to alteration after a cutter has been purchased. The one variable factor is **CLEARANCE**. Cutter clearance generally varies from 2 degrees to 15 degrees, the basic rule being, "Give the cutting edge the maximum backing without letting the heel of the tooth drag."

Previous to the introduction of this new Starrett Cutter Clearance Gage the matter of determining correct clearance has been largely indefinite. The use of a protractor laid on the face of the cutter, or indicating same on cutters with a dial indicator, translating thousandths reading into degrees, etc., has been the slow and expensive way since one method or the other required removal of the cutter from its arbor in the milling machine, or removal from the arbor of the grinding machine. We claim, with this gage, in any department where cutter grinding takes place it will save many dollars by cutting the grinding expense, more work between grinds, less "out time" of machine, less wear on machines and finally, more and better production. It is the type of gage that grows with one as it is used. The illustrations on the opposite page tell at a glance a few of its many applications. Helps check clearances from $\frac{1}{2}$ " to 2" in diameter and accurately checks clearance on cutters from 2" to 30" or more in diameter on end, side, spiral, helix and inserted teeth milling cutters.

The main sections of the gage are made of tool steel, hardened to withstand wear at contact points. The sliding bar, reversible on the beam, increases its scope. The flat foot of the sliding bar is on the line with the foot of the frame thus making the measurement of side clearance on large diameter coarse pitch cutters an extremely simple one. Graduated to read by degrees from 0 to 20. The upright blade is both perpendicularly and angularly adjustable and each clamping action thereof is independent of the other.

Price No. 459.....\$15.00 With Leather Case.....\$17.75

Sent with case unless otherwise ordered.

Packed 1 in a box.

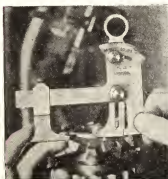
Starrett Cutter Clearance Gage No. 459



Checking Peripheral Clearance
on a 6" x 15" Inserted Cutter at
Different Positions.



Gage Used on Special Angular
Cutter.



Check Side Clearance of 4" x $\frac{3}{4}$ "
Alternate Tooth Mill.



Gage Used on Diameter of 4"
Helical Mill.

See pages 304 and 305 for description and cut of gage.



Right on the 59°

That's the way to have 'em for good work and quick work, too. And that's the way you always *will* have 'em if you've got a Starrett No. 22 Drill Point Gage handy. And you'll be surprised at the number of drills you save.

The Starrett No. 22C Drill Point Gage for small drills makes a mighty handy combination as well. It combines six tools.

These useful gages come pretty close to being a necessity in shops that are watching drill costs.

Ask your tool dealer to show them to you. You'll wonder how you ever got along without them.

For prices see page 308



STARRETT
DRILL POINT
GAGE No. 22

STARRETT
DRILL POINT
GAGE No. 22C
FOR
SMALL DRILLS

Here's a handy little combination Drill Point Gage, Hook Rule, Plain Rule, Depth Gage, Try Square and Slide Caliper. Just out. Ask your dealer to show you the Starrett No. 22C.

Patented

Drill Point Gage

No. 22

This tool meets the demand for a gage designed for the specific purpose of assisting in grinding drill points accurately. The method followed for sharpening the cutting edges is to do one at a time. For satisfactory results, each lip must not only be the same length, but must also have the same angle in relation to the axis of the drill.

PRICES

No. 22 A	Gage with 12-inch blade complete.....	\$4.90
No. 22 B	Sliding Graduated Head only for (No. 22 A size) .. Recommended for large size drills	3.00
No. 22 C	Gage with 6-inch Hook Rule, complete.....	2.50
No. 22 D	Sliding Graduated Head only for (No. 22 C size) ... Recommended for small size drills	1.25

Blades for both sizes are graduated in 8ths, 16ths, 32nds, and 64ths.

The No. 22 C offers a very complete tool which may be used as a Drill Point Gage, Hook Rule, Plain Rule, Depth Gage, Try Square and Slide Caliper. The Head only, No. 22 D will fit our spring tempered rules of same width and thickness viz.; our Nos. 300, 303, 600 and 603; in the 6 inch lengths.

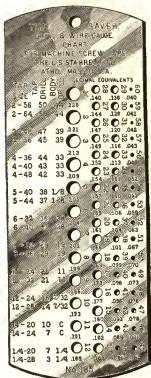
Graduations are 8ths, 16ths, 32ds and 64ths.

Packed 1 in a box.

Trade Mark

Time Saver

Reg. U.S. Pat. Off.

Tap and Drill Gage
No. 185Tap and Drill data on this Gage conforms to the
National Coarse and National Fine Thread Series

This gage is approximately $\frac{1}{4}$ inch thick, $2\frac{1}{4}$ inches wide and $6\frac{1}{4}$ inches long. It is hardened, ground and rubbed to a bright finish and is thoroughly tested after hardening.

By the use of this gage one is enabled to select at once the right sized drill to suit machine screw taps most commonly used, leaving just stock enough for the tap to cut as near a full thread as is practicable for one tap without breaking it, thus saving much time and uncertainty of result attending the former crude ways of making a selection.

Explaining the chart, the first row of figures, for an example, read thus, 2-56-50. The number 2 (in the first row of figures) means the number or size of tap; 56 the pitch or size of thread; 50 the size of drill to use which will leave the right stock for proper thread; and the number, 44, in last column, is the size of drill to use to let the tap, screw, or bolt through freely.

The figures—1, etc., up to 60—designate the number of drill (size agreeing with the holes). Other figures, 228, 221, etc., designate the size of hole in thousandths of an inch.

Price.....\$2.40

Packed 3 in a box

Drill and Steel Wire Gage No. 186

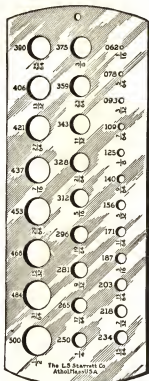


This gage gives the number of drill to fit each hole, and the size of the hole in thousandths of an inch. This gage is about $\frac{1}{4}$ inch thick, $1\frac{1}{2}$ inches wide, and $5\frac{1}{2}$ inches long. It is hardened, ground and rubbed to a bright finish and is thoroughly tested after hardening.

Price.....\$2.00

Packed 3 in a box.

Jobbers' Drill Gage No. 187



This gage shows sizes from $\frac{1}{16}$ inch to $\frac{1}{2}$ inch, varying by 64ths, and is about $\frac{1}{4}$ inch thick, $2\frac{1}{2}$ inches wide, $6\frac{1}{4}$ inches long. It is hardened, ground and rubbed to a bright finish and is thoroughly tested after hardening.

Price.....\$2.75

Packed 3 in a box.

Drill and Steel Wire Gage No. 286

This gage gives the number and decimal equivalents of standard sizes from 61 to 80 inclusive. It is adapted to gage small twist drills and fine drill rods. Each gage is hardened, ground and rubbed to a bright finish and thoroughly tested after hardening. Size of gage $\frac{1}{4}$ inch thick, $\frac{3}{4}$ inch wide, and 2 inches long.



Price\$2.40
 Packed 3 in a box.

Steel Music Wire Gage

No. 280



Cut full size.

Wasburn & Moen standard.

Each gage has a bright finish and is carefully tested after hardening. Numbers 12 to 28.

Price\$1.80
 Packed 2 in a box.

Sizes of the Numbers of Steel Music Wire Gage

No. of Gage	Size of Each No. in Decimal Parts of an Inch	No. of Gage	Size of Each No. in Decimal Parts of an Inch
8-0	.0083	12	.0296
7-0	.0087	13	.0314
6-0	.0095	14	.0326
5-0	.010	15	.0345
4-0	.011	16	.036
3-0	.012	17	.0377
2-0	.0133	18	.0395
1-0	.0144	19	.0414
1	.0156	20	.0434
2	.0166	21	.046
3	.0178	22	.0483
4	.0188	23	.051
5	.0202	24	.055
6	.0215	25	.0586
7	.023	26	.0626
8	.0243	27	.0658
9	.0256	28	.072
10	.027	29	.076
11	.0284	30	.080

See page 357 for comparison of wire gage standards.

Music Wire Gage No. 295

New Am. S. & W. Co., Standard



This gage has black finish and has the decimal equivalents of each number stamped on the back. Each gage carefully tested after hardening. Numbers 6-0 to 33.

No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch
6-0	.004	8	.020	21	.047
5-0	.005	9	.022	22	.049
4-0	.006	10	.024	23	.051
3-0	.007	11	.026	24	.055
00	.008	12	.029	25	.059
0	.009	13	.031	26	.063
1	.010	14	.033	27	.067
2	.011	15	.035	28	.071
3	.012	16	.037	29	.075
4	.013	17	.039	30	.080
5	.014	18	.041	31	.085
6	.016	19	.043	32	.090
7	.018	20	.045	33	.095

Price.....\$3.00

Packed 2 in a box.

See page 357 for comparison of wire gage standards.

English Standard Wire Gages No. 188 and No. 189

Birmingham or Stubbs'



Sizes of the Numbers of English Standard Wire Gage

These gages have black finish and the decimal equivalents of each number are stamped on the back.

Each gage tested carefully after hardening.

No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch
0000	.454	11	.120	25	.020
000	.425	12	.109	26	.018
00	.390	13	.095	27	.016
0	.340	14	.083	28	.014
1	.300	15	.072	29	.013
2	.284	16	.065	30	.012
3	.259	17	.058	31	.010
4	.238	18	.049	32	.009
5	.220	19	.042	33	.008
6	.203	20	.035	34	.007
7	.180	21	.032	35	.005
8	.165	22	.028	36	.004
9	.148	23	.025		
10	.134	24	.022		

PRICES

No. 188	Numbers 1 to 36	\$3.00
No. 189	" 6 to 36	2.50

Packed 2 in a box.

See page 357 for comparison of wire gage standards.

American Standard Wire Gages

No. 281



Adopted by the brass manufacturers in January, 1858.

Each gage has black finish and is carefully tested after hardening.

The decimal equivalents of each number are stamped on the back.

PRICES

No. 281

Numbers 0 to 36. \$3.00

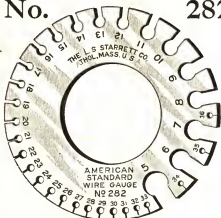
No. 282

Numbers 5 to 36. \$2.50

Packed 2 in a box.

See page 357 for comparison of wire gage standards.

No. 282



United States Standard Gage

No. 283

For Sheet and Plate Iron and Steel



This gage takes in sizes from No. 0 to No. 36. The gage numbers are those of the U. S. Standard Gage for sheet and plate iron and steel, adopted by Congress, March 3, 1893.

Size of gage is approximately $3\frac{1}{4}$ inches in diameter by $\frac{1}{4}$ inch thick. The decimal equivalents of each number are stamped on the back. Each gage has the black finish and is carefully tested after hardening.

PRICE

No. 283 Numbers 0 to 36..... \$3.00

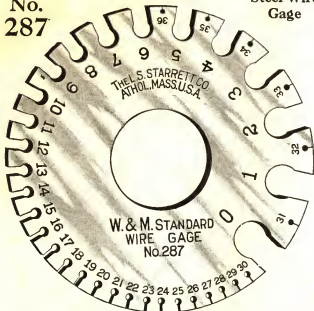
Packed 2 in a box.

See page 357 for comparison of wire gage standards.

Washburn & Moen Standard Wire Gage

No.
287

Steel Wire
Gage



This gage takes in sizes from 0 to 36. The gage numbers are those of the Washburn & Moen Standard. Decimal equivalents on the back.

Size of gage approximately $3\frac{1}{4}$ inches diameter by $\frac{1}{4}$ inch thick.

Each gage has the black finish and is carefully tested after hardening.

No. 287 Numbers 0 to 36, Price,\$3.00

Sizes and Numbers of Washburn & Moen Standard Wire Gage

No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch	No. of Wire Gage	Size of Each No. in Decimal Parts of an Inch
0000	.3938	11	.1205	24	.0230
000	.3625	12	.1055	25	.0204
00	.3310	13	.0915	26	.0181
0	.3065	14	.0800	27	.0173
1	.2830	15	.0720	28	.0162
2	.2625	16	.0625	29	.0150
3	.2437	17	.0540	30	.0140
4	.2253	18	.0475	31	.0132
5	.2070	19	.0410	32	.0128
6	.1920	20	.0348	33	.0118
7	.1770	21	.0317	34	.0104
8	.1620	22	.0286	35	.0095
9	.1483	23	.0258	36	.0090
10	.1350				

Packed 2 in a box.

See page 357 for comparison of wire gage standards.

Imperial Standard Wire Gages No. 441 and No. 442



The decimal equivalents of each number are stamped on the back.

Each gage is carefully tested after hardening. No. 441 with friction spring retains any position at which it may be set, and is made with bright finish.

No. 441 made in two sections, which fold together. Diameter, approx. $2\frac{1}{4}$ in.

No. 442 made in one piece with black finish. Diameter, approx. $3\frac{1}{4}$ in.

PRICES

No. 441 Numbers 1 to 36..... \$3.50

No. 442 " 1 " 36..... 3.00

Packed 2 in a box.

See page 357 for comparison of wire gage standards.

Wire Gage Guide No. 288



As used with wire gage
Front Reverse

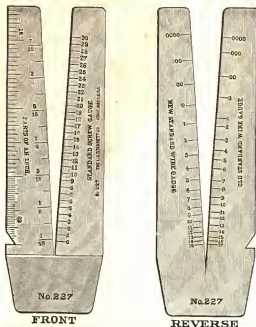
A time saver and mistake eliminator for all workmen using a wire gage on duplicate work. The gage is held on the central stud, and may be securely locked in any position, so that all but the required number will be covered, thus making mistakes impossible, and saving the time formerly used in hunting for the size.

Size A made to be used with English Standard Wire Gage No. 189 and American Standard Wire Gage No. 282.

Size B made to be used with English Standard Wire Gage No. 188 and American Standard Wire Gage No. 281; United States Standard Gage 283, and Washburn & Moen Standard Wire Gage No. 287, also Imperial Standard Gage No. 442. Specify No. 288 A or No. 288 B when ordering.

Price..... \$0.65

Screw and Wire Gage No. 227



FRONT

REVERSE

The gage is made of spring tempered steel and is easily carried in the pocket by those often handling screws and wire in hardware stores, stock rooms, etc. As shown by the cuts, this is an angular gage marked to show at the right of the opening (front view) all sizes of the American Standard Screw Gage from 0 to 30 and is equally adapted to measuring wire, as well as machine and wood screws. The gage can also be used to measure A. S. M. E. Standard Screws. Altho there is a difference of one or two thousandths for the same number, it is not enough to affect the reading of the gage. At the left of the opening it is marked to read fractions of an inch from $\frac{1}{16}$ inch to $\frac{1}{8}$ inch. The shorter intermediate lines make possible readings by 32nds of an inch.

The $3\frac{1}{2}$ inch scale, $2\frac{1}{2}$ inches graduated by 16ths and 1 inch by 32nds is ordinarily sufficient to take length measurements of screws, etc.

One end of the scale is cut out for a countersunk head screw while the other end is made square to measure from a sharp right angle.

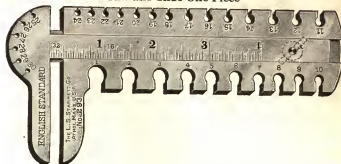
The reverse side of the gage is graduated to read by the old standard or English Wire Gage from 17 to 0000 and by the new standard or American Wire Gage from 15 to 0000.

A screw or wire is measured by placing it in the opening until its weight brings up against both sides; the division at contact point indicates the number of the gage.

Price..... \$3.00
Packed 3 in a box.

Caliper and Wire Gages No. 293

Specially for Use in Steel Mills
Jaw and Slide One Piece



This gage is made only in the English or Birmingham Standard and the United States Standard for sheet and plate iron and steel. As gages in rolling mills are preferred as compact as possible, yet strong enough to withstand hard usage, the movable jaw and graduated slide are made in one piece. It is hardened and finished bright. Graduations first inch are 32nds, remainder 16ths. Opening of Caliper 4 inches. Depth of jaws $1\frac{1}{4}$ inches. Width $1\frac{1}{2}$ inches.

PRICES

No. 293A Sizes 1 to 30, English or Birmingham Standard.....\$16.00
No. 293B Sizes 1 to 30, United States Standard..... 16.00

Packed 1 in a box.

Rolling Mill Gages



These gages are especially adapted to the hard use they are likely to receive in rolling mills and in places where constant measurements are to be taken quickly. The decimal equivalents of each number are stamped on the back with extra large figures. They are hardened and tempered and each gage is carefully tested. They are approximately $\frac{3}{16}$ inch thick, $1\frac{1}{4}$ inches wide and $5\frac{1}{2}$ inches long, and have black finish.

No. 477 English or Birmingham Standard. Numbers 000 to 25.....Price \$4.00
No. 478 English or Birmingham Standard. Numbers 1 to 32.....Price 4.75
No. 479 U. S. Standard. Numbers 000 to 25. For Sheet and Plate Iron and Steel.....Price 4.00

Packed 3 in a box.

Cross-Test Level and Plumb



No. 134

Nickel Plated

This is a well made and reliable tool, and valuable in plumbing, approximate squaring and leveling work. Just the level to use about a planer or in setting up machinery. Leveling is indicated every way without moving the tool.

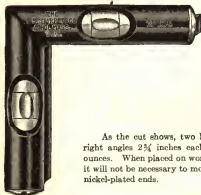
It weighs three ounces. Size 2 inches by 3 inches by $\frac{1}{4}$ inch thick. Can be easily carried in the pocket.

Price.....\$1.75

Packed 1 in a box.

Cross-Test Level

No. 136



As the cut shows, two levels in one frame, extending at right angles $2\frac{3}{4}$ inches each way. The level weighs but 4 ounces. When placed on work to be leveled in both directions, it will not be necessary to move the tool. It is japanned; with nickel-plated ends.

Price.....\$0.90

Packed 1 in a box.

Engineers' and Plumbers' Levels

No. 133



The above represents an adjustable, incline level, a fixed level, and a plumb. The hinged tube inside the working faces of the frame, carrying a level glass, is adjustable to the graduated scale, and shows any incline by 32ds (or less) to 2 inches to the foot without interfering in the least with the plumb or level.

A longitudinal groove in seat of frame (not shown in cut) adapts it to rest on a cylindrical shaft or pipe as well as on flat surfaces, making it convenient to determine the pitch in laying tile pipe, drain pipes, etc.

These levels are supplied with either ground or plain glasses.

PRICES

No. 133 A	10 inch, with plain vials	\$4.00
No. 133 B	15 " " " "	4.25
No. 133 C	10 " " ground and graduated vials	7.00
No. 133 D	15 " " " " " "	7.25

No. 133 A sent unless otherwise ordered.

No. 133 M

Metric

The same as No. 133 except that the scale has metric graduation, and shows any incline by millimeters or less up to an incline of 4 centimeters to 30 centimeters.

PRICES

No. 133 MA	25 cm., with plain vials	\$4.00
No. 133 MB	38 " " " "	4.25
No. 133 MC	25 " " ground and graduated vials	7.00
No. 133 MD	38 " " " " " "	7.25

No. 133 MA sent unless otherwise ordered.

Above numbers packed 1 in a box.

Adjustable Bench Levels

With plain or ground and graduated vials—accurate and very sensitive.
NOTE. A ground vial is ground slightly concave on the inside, removing any small particles on the surface, giving a more sensitive bubble.

These levels are so constructed that they can be accurately adjusted, and when so adjusted are not liable to get out of true, the vials being set in tubes having solid ends which are firmly clamped to the base. The tubes are nickel plated and the bases are japanned. The outer tube being conveniently knurled with its friction fit may be turned so as to protect the glass when not in use. These levels have the longitudinal groove mentioned on page 321.



4 in., 6 in., and 8 in., sizes.



12 in. size. The 18 in. is similar, but with double plumb.

No. 95

PRICES

4 inch, with plain vial	\$1.75
6 " " " "	2.00
8 " " " "	2.25
12 " " " " with plumb	3.50
18 " " " " with double plumb	5.00

No. 96

PRICES

4 inch, with ground and graduated vial	\$3.25
6 " " " "	4.00
8 " " " "	4.50
12 " " " " with plumb	6.50
18 " " " " with double plumb	9.00

Above numbers packed 1 in a box.

Improved Levels For Testing Shafting, etc.

With plain or ground and graduated vials

In addition to the regular parallel vial, the bases have a cross level which enables one to place or hold the base on a shaft level in its cross section, not canted sidewise; for the shape of a level glass is such that, though true as adjusted on a flat surface, it will not be reliable when canted sidewise. Hence the value of the cross level, not only to test the truth of shafting, but other surfaces which tend to throw the level base into a canting position.

The base of this level has our concaved groove running through the length of its base, leaving a flat margin each side, which improves its seat for flat work, while forming an absolutely true and reliable seat for shafting, etc. These levels are adjustable and have the outer tube for protecting the glass when not in use.



6 in. and 8 in. sizes.



12 in. size. The 18 in. is similar, but with double plumb.

No. 97

PRICES

6 inch, with plain vial	\$2.25
8 " " " "	2.75
12 " " " " with plumb	4.00
18 " " " " with double plumb	6.00

No. 98

PRICES

6 inch, with ground and graduated main vial	\$4.25
8 " " " " " " "	5.00
12 " " " " " " " with plumb	7.00
18 " " " " " " " with double plumb	10.00

Above numbers packed 1 in a box.

Master Precision Level

For Erecting and Testing Machinery, etc.

No. 199

With 10 Second Level Vial



A new addition to our extensive line of iron levels. Designed only after much thought and experimentation to give the set-up men and manufacturers of all kinds of machinery a real precision and sensitive level. Too many machines are erroneously condemned when the whole fault is improper leveling. Present day production and accuracy, to a large degree, depends on the levelness of the set-up. With this level, the operator can read and readily figure the exact variation from level and make the necessary adjustments.

Attention is called to the following phases of construction. Main ground and graduated vial of 10 seconds accuracy, one division equaling $\frac{1}{2}$ thousandth (0.0005) of an inch per foot. An auxiliary level to aid setting true horizontal, showing position laterally. Level vials set so breakage is reduced to a minimum. Fool proof adjustment to avoid tampering, once set. Special alloy iron is employed to obtain freedom from thermal effects. Castings are thoroughly seasoned, machined and scraped. Non-machined surfaces have a black crackle finish. Insulation from handling through the top plate of non-conductive material. The length is 15 inches, height 3 inches, width $1\frac{1}{2}$ inches and the weight about $5\frac{1}{2}$ pounds. Price, No. 199 including finished wood case. \$50.00

Packed 1 in a box.

Level Sight Attachments No. 131



These attachments are made to slip on and off the top side of our iron levels and are held in place by suitably knurled clamp screws. They have sight holes—one with a cross wire to line accurately from top of and parallel with level. Sighting through the holes will enable one to use the common level for leveling a plot of ground from a fixed point at long range.



These attachments are made to fit 6 in., 9 in., 12 in., 18 in., and 24 in. No. 132 levels, as well as our No. 133 levels.

Price, per pair \$0.90

Packed 1 pair in a box.

Aluminum Line Level No. 108

Weight, only $\frac{1}{2}$ oz.



Line levels are used in laying foundations, tile pipe, cement and brick walls, working ditches, determining grades, building roads, trimming hedges, etc. Can also be used as a surface level. Note the reverse position of the slots which prevents its dropping off the line when in use. The lightness of this level tends to eliminate sag in the line. Made from $\frac{3}{4}$ inch hexagonal stock 3 inches long and weighing but $\frac{1}{2}$ ounce it may be conveniently carried in the pocket. A luminous level glass with a yellowish fluid which is preferable in line levels is furnished in this level.

This level glass has two graduated lines to check true level, also a metal guard to prevent breakage. The approximate level can be determined with this metal guard.

Price \$0.50

Packed 1 in a box, 6 in a carton.



Starrett
Leveling
Instrument
No. 101C

**on th'
level—**

here's an instrument that doesn't require an engineer to handle it and yet does good, accurate work.

It's not a cheap instrument—even if it is low priced—but neither has it a lot of the attachments that make the regular engineer's level such a difficult instrument for any but the trained man to use. And it does good, accurate, dependable work—as lots of builders who use one can testify. If you can figure a job, you'll have no difficulty in handling this instrument. Let us send you a free copy of the Starrett Transit and Level Book.

Leveling Instrument

No. 101



No. 101 G



It should be borne in mind that our leveling instruments do all that a transit will do except measure vertical angles. These instruments attain angles in a horizontal plane only, and are designed for the use of farmers, contractors, carpenters, millwrights, masons, surveyors, etc.

Its lightness, simple construction, and moderate price, combined with the wide range of work to which it can be applied, make it very desirable for all who have occasion to use such an instrument. The upper plate is connected to the tripod head by a ball and socket joint, and is leveled by the leveling screws. This plate is recessed to contain a graduated arc for taking angles, and on the plate is the frame with level and sight tube for taking horizontal angles only. The nickel-plated SIGHT TUBE on the No. 101A and No. 101B is PLAIN, with no lenses, 12 in. long, with small eye aperture and the usual cross wires. The TELESCOPE on the No. 101C is the same as that used on the No. 99F Transit. It has cross lines, is adjustable to distances, and is the same size and length as plain sight tube. Other features are precisely the same as the transit described and shown on the following page.

Directions for setting up and using are inclosed with each leveling instrument. Furnished in wood carrying case.

Weight, packed in box for shipment, approximately 20 pounds.

PRICES

No. 101A	With plain sight tube, long legs and plain level vial.....	\$15.00
No. 101B	With plain sight tube, long legs and ground level vial.....	16.75
No. 101C	With telescope, long legs and ground level vial.....	25.00
	Iron target, without pole.....	1.50

Note: See Wood Levelling Rod and Target listed on page 331.

Transit No. 99



No.99



To meet the demands of contractors, builders, carpenters, farmers and others for a transit and level, low in price, yet sufficiently accurate for their needs, we have developed the Starrett transit and level. These instruments are very simple; they do not have the expensive attachments found on engineers' instruments. The builder and contractor find them indispensable in laying out building lots, locating batter boards, leveling foundation walls, and in pouring concrete floors. Farmers and ranchers use them in laying out modern tile drainage systems, irrigation ditches and new roads. Millwrights and machinists may use the Starrett level to advantage in leveling and aligning shafting in mill or factory. In general it may be said that the Starrett transit or level can be used for the same purpose as any engineer's transit and level. Free from complications and confusing adjustments, any man may use these instruments without the knowledge of higher mathematics and engineering principles necessary for using the much higher priced engineer's transits.

A comprehensive booklet explaining in detail the uses and illustrating practical problems accompanies each instrument. One of these booklets will be mailed on request to any one interested.

The instrument is composed of iron and brass, and consists of a tripod, to the head of which is connected, by a ball-and-socket joint, an upper plate which can be leveled by the leveling screws.

This plate is recessed to contain a graduated arc for taking horizontal angles. This arc is $\frac{1}{2}$ of a circumference, reading 90° each side of 0, and being independent of level and sight tube can be turned and used at any point of a complete circle. On this plate rests a triangular frame to which are attached a level, a graduated arc for taking vertical angles, graduated 45° each side of 0, and a sight tube or telescope.

The PLAIN SIGHT TUBE has no lenses, is brass, twelve inches long; in one end is a small eye aperture, in the other the usual cross wires.

Transit No. 99

The TELESCOPE has cross lines, is adjustable to distances, and is same size and length as plain sight tube. The lens is well protected from dirt and breakage by a friction cap, and a shutter for the eye aperture.

With short legs, as shown in the cut, the instrument is eight inches high. With long extension legs, which fasten on over the short legs, the height can be adjusted from two feet eight inches to four feet eight inches. The sight tube, level case, and graduated arcs are nickel plated, the other parts are japanned.

The advantages of this transit are as follows: The head is held to the tripod with a bolt and knurled nut, so as to make it stationary at any given point; the graduated arcs can be clamped to the base-plate by throwing a small cam arrangement, and a spring indexing finger to mesh in the arc graduations. The transit with short legs is housed in a substantial wood box about $4\frac{1}{2}$ inches \times $9\frac{1}{2}$ inches \times $13\frac{1}{2}$ inches; with a leather strap running completely over the box cover, weighing approximately 8 lbs., making it easily carried about. The extension legs are not packed in the box. They weigh about 6 lbs., so when used with the short legs the transit weighs about 11 lbs.

Directions for setting up and using are inclosed with each transit.

Furnished in wood carrying case.

Weight packed in box for shipment approximately 20 pounds.

PRICES

No. 99 B	With plain sight tube, long legs and plain level vial.....	\$20.00
No. 99 F	With telescope, long legs, and ground level vial.....	40.00
	Iron target, without pole.....	1.50

No. 99 F sent unless otherwise ordered.

Packed 1 in a box.



Wood Leveling Rod and Target No. 999

Made of seasoned stock. These rods have two 4-ft. sections which are easily and quickly aligned by a positive locking arrangement, giving a total height of 8 feet. The bottom of the rods are steel capped.

No. 999A is divided into feet, inches and quarter inches with heavy lines and figures, the foot figures red and the inch figures black.

No. 999B is divided into feet and tenths of a foot, the foot figures red and the tenth figures black.

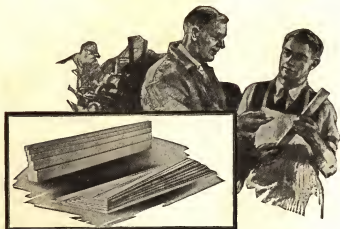
Approximate Weight $1\frac{1}{4}$ lbs.

PRICES

No. 999A	Rod and Target, feet, inches and quarter inches.....	\$5.00
No. 999B	Rod and Target, feet and tenths of feet....	5.00

No. 999A sent unless otherwise ordered

Packed 1 in a package



"It's Starrett Ground Flat Stock"

"And that means it's accurate to a thousandth of an inch. Believe me, we're done with hunting up odd pieces of stock and trying to grind them to size, in *this* shop. We've found it's less expensive and less wearing on our dispositions to have Starrett Ground Flat Stock in the right sizes right where we can put our hands on it."

Some of the jobs on which time and money will be saved, by using Starrett Ground Flat Stock.

Test Tools, Die Work, Jigs, Fixtures, Parallels, Machine Parts, Shims, Punch Dies, Flat Gauges, Test Gauges, Snap Gauges, Templates, Stamps and Cutters.

Use Starrett Ground Flat Stock.

Ground Flat Stock

No. 495

Made of First Quality Tool Steel ground to one-thousandth of an inch in thickness. Annealed so that it is easily machined. Very necessary for making flat gages, test tools, jig work, etc. Each piece of stock packed in properly labeled envelope, showing size at a glance. The most convenient way of handling.

Buy it through your Mill Supply Dealer.

Size, Inches	Price, Per Piece	Size, Inches	Price, Per Piece	Size, Inches	Price, Per Piece
1-64		3-32		7-32	
1 x 18 x $\frac{1}{64}$	\$0.85	2 x 18 x $\frac{1}{32}$	\$1.00	3 x 18 x $\frac{1}{32}$	\$2.20
1½ x 18 x $\frac{1}{64}$	1.05	2½ x 18 x $\frac{1}{32}$	1.20	3½ x 18 x $\frac{1}{32}$	2.60
2 x 18 x $\frac{1}{64}$	1.25	3 x 18 x $\frac{1}{32}$	1.40	4 x 18 x $\frac{1}{32}$	3.00
2½ x 18 x $\frac{1}{64}$	1.55	3½ x 18 x $\frac{1}{32}$	1.65	1-4	
3 x 18 x $\frac{1}{64}$	1.85	4 x 18 x $\frac{1}{32}$	1.90	½ x 18 x $\frac{1}{4}$	1.00
3½ x 18 x $\frac{1}{64}$	2.15	5 x 18 x $\frac{1}{32}$	2.75	¾ x 18 x $\frac{1}{4}$	.95
4 x 18 x $\frac{1}{64}$	2.50	6 x 18 x $\frac{1}{32}$	3.75	1 x 18 x $\frac{1}{4}$	1.15
1-32		1-8		1½ x 18 x $\frac{1}{4}$	1.45
¾ x 18 x $\frac{1}{32}$	.60	½ x 18 x $\frac{1}{8}$	.60	2 x 18 x $\frac{1}{4}$	1.80
1 x 18 x $\frac{1}{32}$	.60	¾ x 18 x $\frac{1}{8}$	.70	2½ x 18 x $\frac{1}{4}$	2.20
1½ x 18 x $\frac{1}{32}$	.80	1 x 18 x $\frac{1}{8}$	.75	3 x 18 x $\frac{1}{4}$	2.60
2 x 18 x $\frac{1}{32}$	1.00	1½ x 18 x $\frac{1}{8}$	.85	3½ x 18 x $\frac{1}{4}$	3.05
2½ x 18 x $\frac{1}{32}$	1.25	2 x 18 x $\frac{1}{8}$	.90	4 x 18 x $\frac{1}{4}$	3.50
3 x 18 x $\frac{1}{32}$	1.50	2½ x 18 x $\frac{1}{8}$	1.05	5 x 18 x $\frac{1}{4}$	4.50
3½ x 18 x $\frac{1}{32}$	1.75	3 x 18 x $\frac{1}{8}$	1.30	6 x 18 x $\frac{1}{4}$	5.50
4 x 18 x $\frac{1}{32}$	2.00	3½ x 18 x $\frac{1}{8}$	1.50	5-16	
5 x 18 x $\frac{1}{32}$	3.00	4 x 18 x $\frac{1}{8}$	1.75	¾ x 18 x $\frac{5}{16}$	1.25
6 x 18 x $\frac{1}{32}$	4.00	5 x 18 x $\frac{1}{8}$	2.00	¾ x 18 x $\frac{5}{16}$	1.20
3-64		6 x 18 x $\frac{1}{8}$	2.85	1 x 18 x $\frac{5}{16}$	1.50
1 x 18 x $\frac{3}{64}$	.55	6 x 18 x $\frac{1}{8}$	4.00	1½ x 18 x $\frac{5}{16}$	1.80
1½ x 18 x $\frac{3}{64}$	.75	5-32		2 x 18 x $\frac{5}{16}$	2.15
2 x 18 x $\frac{3}{64}$	.95	¾ x 18 x $\frac{5}{32}$	.75	2½ x 18 x $\frac{5}{16}$	2.60
2½ x 18 x $\frac{3}{64}$	1.15	1 x 18 x $\frac{5}{32}$	.85	3 x 18 x $\frac{5}{16}$	3.05
3 x 18 x $\frac{3}{64}$	1.40	1½ x 18 x $\frac{5}{32}$	1.10	4 x 18 x $\frac{5}{16}$	4.00
4 x 18 x $\frac{3}{64}$	1.90	2 x 18 x $\frac{5}{32}$	1.40	3-8	
5 x 18 x $\frac{3}{64}$	2.75	2½ x 18 x $\frac{5}{32}$	1.60	¾ x 18 x $\frac{3}{8}$	1.50
6 x 18 x $\frac{3}{64}$	3.75	3 x 18 x $\frac{5}{32}$	1.80	¾ x 18 x $\frac{3}{8}$	1.50
1-16		3½ x 18 x $\frac{5}{32}$	2.00	1 x 18 x $\frac{3}{8}$	1.65
¾ x 18 x $\frac{1}{16}$	.40	4 x 18 x $\frac{5}{32}$	2.30	1½ x 18 x $\frac{3}{8}$	1.75
¾ x 18 x $\frac{1}{16}$	.45	3-16		2 x 18 x $\frac{3}{8}$	2.05
1 x 18 x $\frac{1}{16}$	.50	½ x 18 x $\frac{3}{16}$	.75	2½ x 18 x $\frac{3}{8}$	2.40
1½ x 18 x $\frac{1}{16}$	.65	¾ x 18 x $\frac{3}{16}$	.90	3 x 18 x $\frac{3}{8}$	2.95
1½ x 18 x $\frac{1}{16}$	.70	1 x 18 x $\frac{3}{16}$	.95	3½ x 18 x $\frac{3}{8}$	3.50
2 x 18 x $\frac{1}{16}$	.90	1½ x 18 x $\frac{3}{16}$	1.15	4 x 18 x $\frac{3}{8}$	4.50
2½ x 18 x $\frac{1}{16}$	1.10	2 x 18 x $\frac{3}{16}$	1.20	1-2	
3 x 18 x $\frac{1}{16}$	1.35	2½ x 18 x $\frac{3}{16}$	1.50	½ x 18 x $\frac{1}{2}$	1.75
3½ x 18 x $\frac{1}{16}$	1.60	3 x 18 x $\frac{3}{16}$	1.70	¾ x 18 x $\frac{1}{2}$	2.15
4 x 18 x $\frac{1}{16}$	1.85	3½ x 18 x $\frac{3}{16}$	2.00	1 x 18 x $\frac{1}{2}$	2.65
5 x 18 x $\frac{1}{16}$	2.50	4 x 18 x $\frac{3}{16}$	2.30	2 x 18 x $\frac{1}{2}$	3.30
6 x 18 x $\frac{1}{16}$	3.50	5 x 18 x $\frac{3}{16}$	2.60	3 x 18 x $\frac{1}{2}$	4.40
3-32		6 x 18 x $\frac{3}{16}$	3.50	4 x 18 x $\frac{1}{2}$	5.40
½ x 18 x $\frac{3}{32}$	.55	7-32		3-4	
¾ x 18 x $\frac{3}{32}$	.65	1 x 18 x $\frac{7}{32}$	1.05	¾ x 18 x $\frac{3}{4}$	2.50
1 x 18 x $\frac{3}{32}$	.70	1½ x 18 x $\frac{7}{32}$	1.35	1	
1½ x 18 x $\frac{3}{32}$	.85	2 x 18 x $\frac{7}{32}$	1.60	1 x 18 x 1	3.25
		2½ x 18 x $\frac{7}{32}$	1.90		

Other sizes furnished to order. Prices upon application.

Twin Gas Heaters No. 100

Useful in various mechanical trades, radio work, etc.



These Double Tube Gas Heaters are made with nickel plated burners and japanned bases, and, with their attachments, are most convenient and effective heaters.

Their effectiveness lies in their scientific construction, being so made as to cause the gas and air to become thoroughly mixed for perfect combustion while passing through deflectors in base of tubes. The tubes are so formed as to cause the flames to penetrate each other at cross angles, thus producing a clean, intense heat, free from smoke and with no waste of gas.

The heater will be found very useful in the machine shop, as it is convenient for tempering small tools, melting lead, babbitt, etc., and as a forge for light work it will be found very valuable. Plumbers, tin-smiths, electricians, jewelers, dentists, barbers and others will also find it valuable. For laboratory and household use it has no equal. Over it a quart of water will boil in six minutes.

Screw the burner to the base so that the tool holder E (when in use) will be horizontal. If blaze is not vertical, bend one of the deflectors in or out. They are made for directing the flow of gas to the ducts. Do not get them too close together.

In hardening tools, the burner should be shielded from light and draft. Avoid leakage at joints. Best results are attained with a full head of gas, which with the air is injected through the mixing chamber, producing a blast.

Do not turn the blaze below a blue color, as good results cannot be obtained with a white blaze. If a white blaze appears on lighting, turn out and relight. For holding small pieces to be heated, roll up different sized tubes of tin to act as holders.

Soldering irons with short handles can be used with this heater, without fear of heating the handle.

The two and three burner heaters are made with a graduated adjusting tube on the end to supply the gas to one or more burners. For example, if gas is desired in one burner only, adjust the tube so that the figure one will coincide with the index mark on the base; for gas in two burners have the figure two coincide with the index, and so on.



PRICES

No. 100 A	Burner only without base.....	\$0.75
No. 100 B	One burner with base.....	1.00
No. 100 C	Two burners " "	1.75
No. 100 D	Three " " "	2.50
No. 100 E	Tool holder only.....	.20
No. 100 F	Dish Holder.....	.30
No. 100 G	Ladle only, 14 inches long, 12 ounces in weight.....	.30
No. 100 H	One burner with base (B), with tool holder (E) and dish holder (F).....	1.50

No. 100 H sent unless otherwise ordered.

Hack Saw Frames

Recognized as leaders by all who use Hack Saw Frames; the same as Starrett Tools are known to every user of tools. The best grade of material is used in these frames while the bends are all uniform so that the blade lines up parallel with the back of the frame. Many features and improvements are embodied in STARRETT Frames to withstand the greatest strain and give the longest service.

Particular attention is called to the STARRETT "Pistol Grip" and "Easy Grip" frames. Either of these handles conform to the shape of the hand, permitting perfect control of the frame at all times. Hand cramp is unknown where this type of handle is used. The various Frames as listed, while slightly different in finish or certain refinements, are all made with the same high regard for quality and durability.

Narrow Hack Saw Frame No. 150



A narrow frame holding an 8-inch blade is often in demand as there are many times the conventional run of hack saw frames cannot be used; and where it isn't practical to attempt any cut with the blade only.

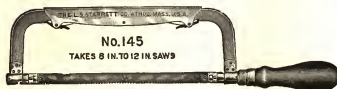
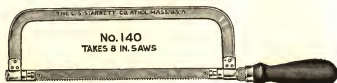
It's a good frame for cutting small pipe, cutting into conduit, B-X tubing, insulation, etc. Has ample rigidity, our usual 4-way blade adjustment and is nickel plated.

An excellent frame for use with our No. 249 Screw Slotting Blades.

Price, with one blade.....\$0.75

Packed 1 in a box.

Hack Saw Frames



Spring plungers overlap the ends of the saw, automatically holding it in position. By slightly pushing them back the saw may be instantly removed, thus furnishing the most convenient way of attaching or detaching the saw ever devised. An improved nut within the handle, turning with it gives the desired tension to the saw, which may be quickly and conveniently set at any required angle. The adjustable or extension back frames have improved spring pawls which securely hold the frames to receive saws of various lengths. The frames are neither too light nor too heavy—just right—are finely finished and nickel-plated. In appearance, workmanship, and utility these tools are not approached by any other hack saw frames made.

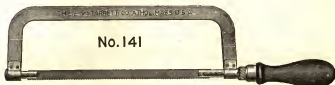


PRICES

No. 140	With one blade	\$1.25
No. 145	" " "	1.75

Above numbers packed 1 in a box.

Hack Saw Frames No. 141



This solid steel frame is very rigid, the stock in same being wider than commonly used, and it cannot be cramped by straining the blade. The saws may be set to cut in any one of four directions and tightened by simply turning the handle. It is well made and in every way just right.

Polished and nickel plated.

PRICES

8 inch, with one blade.....	\$0.85
9 " " " " ".....	.90
10 " " " " ".....	1.00
12 " " " " ".....	1.10

Packed 1 in a box.

Hack Saw Frame No. 146



This is, we believe, a better frame for the price than any other made. The stock is wider and more rigid than commonly used and cannot be cramped when saws are tightened up, and will not tremble when used. It is well made with our improved adjustable back and will take in 8, 9, 10, 11, and 12 inch saws, which may be set to cut in any one of four directions, and tightened by simply turning the handle. Polished and nickel plated.

Price, with one blade..... \$1.50

Packed 1 in a box.

Hack Saw Frames No. 143

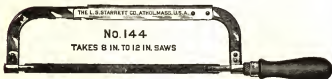


This solid steel frame is not as highly polished as our other solid frame, No. 141. Made with dull nickel finish.

The saws may be set to cut in any one of four directions, and tightened by simply turning the handle. One blade sent with each frame.

PRICES			
8 in. \$0.75	9 in. \$0.80	10 in. \$0.90	12 in. \$1.00

No. 144

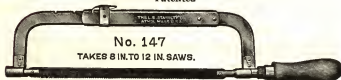


This frame is nickel-plated, dull finish. It is well made, with our improved adjustable back, and will take in 8, 9, 10, 11 and 12 inch saws, which may be set to cut in any one of four directions, and tightened by simply turning the handle.

Price, with one blade.....\$1.00

No. 147

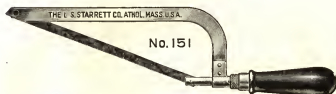
Patented



The back in this hack saw frame is made from 16 gage tubing and is very rigid. The frame telescopes inside the tube and by means of the dog engaging in slots in the frame, adjustment can be made to accommodate saws, 8, 9, 10, 11 and 12 inches in length. May be set to cut in any one of four directions. Nickel-plated.

Price, with one blade.....\$2.25
Above numbers packed 1 in a box.

Hack Saw Frame No. 151



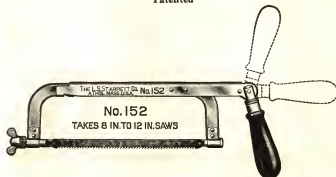
Here's a triangular shaped frame of which hacksaw users will quickly recognize the advantage over the ordinary frame when used in more or less close quarters. It was primarily designed for cutting bands on Ford cars and trucks but is well suited for weatherstrip and pruning work.

Hard wood handle. Frame has dull nickel finish. Takes 8 inch saws only.
Price, with one blade.....\$1.15

Adjustable Handle Hack Saw Frame No. 152

For Automobile Repairmen, Plumbers, Steamfitters and Electricians

Patented

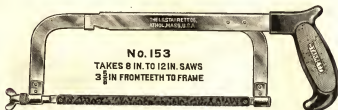


Simplicity of adjustment of the handle to suit working conditions is the attractive feature of this frame. Thirteen positive locking positions of the handle are possible, and when set to facilitate cutting in a strained or awkward position, it materially lessens saw breakage. Saws may be quickly changed and set to cut in any one of four directions. Made with dull nickel finish.

Price, with one blade.....\$1.75

Above numbers packed 1 in a box.

Pistol Grip Hack Saw Frame No. 153



A real hack saw frame with a "hang" that gives it the name, pistol grip. Other features of its structure are, *easily and rapidly adjustable back* like our No. 144, page 338, *resistance to buckle*, when using longer blades, *reversible wing nut* so tension of blade can be made at opposite end from the illustration, thus removing possible interference with stroke, *ample finger space* inside the handle and a tough black composition handle moulded as one piece.

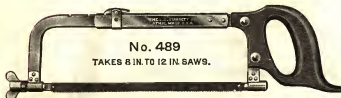
Takes 8 to 12 inch saws which are faceable in four directions. Bright nickel plated frame.

Price, with one blade..... \$1.75

Packed 1 in a box.

Hack Saw Frame No. 489

Patented



The same design as our No. 147 frame, except that it is made from slightly heavier stock, and with "Easy Grip" hardwood handle. Can be set to cut in any one of four directions and the desired tension obtained by turning the wing nut. Will accommodate saws from 8 to 12 inches. Nickel plated.

Price, with one blade..... \$2.75

Packed 1 in a box.

Easy Grip Hack Saw Frame No. 169

Patented

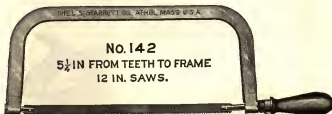


Anyone using this hacksaw frame will appreciate the design, adjustment, rigidity and equalization of balance. It has just the right "hang" and there is ample finger room inside the handle. The constant spring tension on the bolts holding the blade and the adjustment on the hack make changing a blade an easy and quick operation. The blade may be set to cut in any one of four directions. This frame has a checked hard rubber handle, and all steel parts are nickel plated. The depth of the frame from the cutting edge of the blade is about $3\frac{3}{8}$ inches. The adjustment by means of the pawl as shown in the cut permits the use of blades 8 to 12 inches inclusive.

Price, with one blade.....\$3.25

Packed 1 in a box.

Heavy Hack Saw Frame No. 142

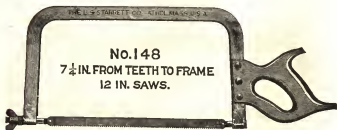


For cutting girders, steel rails, etc. With hardwood handle. Takes 12 inch saws only. Depth of frame from teeth of saw to inside edge of frame, $5\frac{1}{2}$ inches Nickel-plated.

Price, with one blade.....\$2.00

Packed 1 in a box.

Heavy Hack Saw Frame No. 148

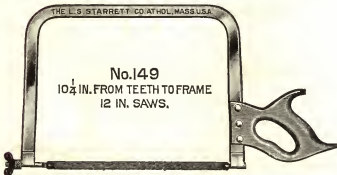


For cutting girders, steel rails, etc. With hardwood handle. Takes 12 inch saws only. From teeth of saw to inside edge of frame, $7\frac{1}{4}$ inches. Nickel-plated.

Price, with one blade.....\$2.75

Packed 1 in a box.

Heavy Hack Saw Frame No. 149



For cutting girders, steel rails, etc. With hardwood handle. Takes 12 inch saws only. From teeth of saw to inside edge of frame, $10\frac{1}{4}$ inches. Nickel-plated.


Price, with one blade.....\$3.00

Packed 1 in a box.

Starrett Hacksaws

With Hack Saw
Blades it's cost per cut
that counts.

There is a Starrett
Hack Saw for every
metal and every job—
power or hand cutting
—and each saw is made
to do its job at lowest
cost per cut.



The Blades for
Super-Service
Starrett High Speed
Steel Hacksaws
Have you tried them?

Starrett Hack Saw Blades are made with the same consideration for Quality and Service as the finest Starrett Precision Tools, which are recognized the world over as the Standard for Accuracy.

They are furnished for use in Hand Frames and Power Machines and are made from high grade Tungsten Alloy Steel or High Speed Steel.

Particular attention is paid to the milling, teeth setting, straightening, hardening, and inspection which insures the uniformity required.

Years of study of the better methods of heat treating assure for Starrett saws greater endurance and toughness.

When specifying, state catalog number and length of saw. Should it not be clear what saw to specify, we suggest details be given with respect to the Shape and Class of material to be cut, and, if for use in Hand Frame or Power Machine. Blades can then be supplied that will be best suited for the work intended.

Select the Blade that suits your job.

The illustrations below show sections of a few STARRETT Blades. Note the difference in number of teeth per inch.



This is a heavy 6 tooth power blade for cutting machinery steel, soft steel and solid stock.



This is an 18 tooth hand blade, the all-round saw for general work. Most commonly used for cutting tool steel, high carbon and high speed steel.



This blade has 32 teeth and is recommended for cutting extra fine stock, thin pipe, tubing and sheet metal.

High Speed Steel Hack Saw Blades

For use in Hand Frames and Power Hack Saw Machines

Their use is no longer an experimental proposition as they have conclusively proven their value wherever metal cutting is practiced. As High Speed Steel Cutters clearly demonstrated their superiority over carbon steel cutters so have High Speed Steel Hack Saw Blades decisively reduced metal cutting costs. Fewer blades are used.

They will wear much longer and average many more cuts than the ordinary saws when used under identical working conditions.

Faster operation, and for some metals double the speed at which ordinary blades should be safely used, is possible by use of STARRETT High Speed Steel Hack Saws. One pitch of teeth will also cut a greater range of metals.

Tough and hard as these blades are they still possess unusual flexibility. They are Superior for Economy, Efficiency and Production if blades of the correct dimensions are used.

Hand Frame as well as Power Machine Operators will benefit greatly by using

STARRETT HIGH SPEED STEEL HACK SAW BLADES.

All Hand Frame Blades measure from center to center of holes. 14 inch, 17 inch and 18 inch Power Blades measure 13½ inches, 16½ inches and 17½ inches respectively, between centers of holes.

All other Power Blades measure from center to center of holes.

**FREE SAMPLES WILL NOT BE FURNISHED
DUE TO THE HIGH COST OF MANUFACTURE.**

High Speed Steel Hack Saw Blades



PRICE LIST—Hand Frame Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
839	12"	$\frac{9}{16}$ "	.025	14	\$48.96
840	10"	$\frac{9}{16}$ "	.025	18	40.32
840	12"	$\frac{9}{16}$ "	.025	18	48.96
841	10"	$\frac{9}{16}$ "	.025	24	40.32
841	12"	$\frac{9}{16}$ "	.025	24	48.96
842	10"	$\frac{9}{16}$ "	.025	32	40.32
842	12"	$\frac{9}{16}$ "	.025	32	48.96

18 Teeth—For cutting tool steel, machine steel, cast iron, bronze, rail, copper and brass.

24 Teeth—For cutting pipe, angles, channels, conduit, drill rod, sheet metal, metal trim and tubing thicker than 18 gauge.

32 Teeth—For cutting pipe, angles, channels, conduit, drill rod, sheet metal, metal trim and tubing thinner than 18 gauge.

Note: The Starrett High Speed Steel Hand Hack Saw Blades take the place of either the all hard type or the flexible back type alloy steel hand blades on any hack-sawing operation, doing the work more quickly and economically.

Packed 6 Dozen in box.

Order by Catalog Number and Size.

High Speed Steel Hack Saw Blades



PRICE LIST—Heavy Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
860	12"	1"	.049	14	\$172.80
860	14"	1"	.049	14	201.60
860	17"	1"	.049	14	244.80
850	12"	1"	.065	10	172.80
850	14"	1"	.065	10	201.60
850	17"	1"	.065	10	244.80
850	18"	1"	.065	10	259.20
852	12"	1"	.065	6	172.80
852	14"	1"	.065	6	201.60
852	17"	1"	.065	6	244.80

6 Teeth—For cutting machine steel, bronze, brass and large sections of other metals in high speed positive feed machine.

10 Teeth—For cutting tool steel, high speed steel, cast iron, thick wall pipe, monel metal, heavy structural shapes and other metals in a medium speed gravity feed machine.

14 Teeth—For cutting high speed steel, pipe, structural shapes, tool steel, etc.

Note: Starrett High Speed Steel Saws of the correct dimensions used in a power hack saw machine of proper type will cut as fast as a circular cold cut-off machine, with much less waste of material, and faster than a band saw machine.

Packed 3 Dozen in box.

Order by Catalog Number and Size

High Speed Steel Hack Saw Blades



PRICE LIST—Extra Heavy Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
853	14"	1¼"	.065	10	\$252.00
853	17"	1¼"	.065	10	306.00
853	18"	1¼"	.065	10	324.00
854	14"	1¼"	.065	4	252.00
854	17"	1¼"	.065	4	306.00
854	18"	1¼"	.065	4	324.00
856	14"	1¼"	.065	6	252.00
856	17"	1¼"	.065	6	306.00
856	18"	1¼"	.065	6	324.00
857	21"	1½"	.065	4	453.60
858	21"	1½"	.065	6	453.60
858	24"	1½"	.065	6	518.40
859	21"	1½"	.065	10	453.60
859	24"	1½"	.065	10	518.40

4 Teeth—For cutting heavy solid bars of soft stock, also annealed tool steel in extra heavy feed power machines.

6 Teeth—For cutting machine steel, medium size bars of annealed tool steel, bronze, brass and large sections of other metals in a high speed positive feed machine.

10 Teeth—For cutting tool steel, high speed steel, cast iron, thick wall pipe, monel metal, heavy structural shapes, and other metals in a medium speed gravity feed machine.

Saws 1¼" wide—packed 2 Dozen in box.

Saws 1½" wide—packed 1 Dozen in box.

Tungsten Steel Hack Saw Blades

Suggestions

Blade should be inserted in frame with teeth pointing away from the operator. Keep blade strained tightly. On the forward stroke bear down sufficiently to stop saw from sliding over work. Sliding glazes the cutting edges and dulls the saw.

Lift the saw on the return stroke, thereby preventing undue rubbing and quick dulling. Keep saw tightened at all times which will prevent crooked cutting. About 40 strokes per minute is satisfactory for general work—fast cutting draws the temper and destroys the blade efficiency.

Flexible blades differ from "all hard" in that the teeth only are hardened. This type of saw used to good advantage on thin sections of soft metals, both sheet and tubing. More satisfactory than the "all hard" blade for certain work when frame is held in strained position. Electricians and Plumbers prefer "flexible" to the "all hard" blades.

For Tungsten Steel Power Machine Blades

We suggest sufficient pressure to be used. Too little pressure lets the saw slide decreasing its cutting efficiency. Keep the blade rigid and lock the work securely in vise when possible. Set the work so that as much bearing as possible is provided for the saw.

Cutting compounds greatly increase your cutting service and reduce cost. If cutting dry on light machine, run about 50 strokes per minute. When cutting compounds are used on medium and heavy machines, about 100 strokes per minute give best results in cutting soft machinery steel and wrought iron. About 75 to 85 strokes are most satisfactory for hard tool or annealed steel.

All Hand Frame Blades measure from center to center of holes, 14 inch, 17 inch and 18 inch Power Blades measure 13½ inches, 16½ inches and 17½ inches respectively, between centers of holes.

All other Power Blades measure from center to center of holes.

Tungsten Alloy Steel Hack Saw Blades



All Hard PRICE LIST—Hand Frame Sizes

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
103	8"	$\frac{1}{16}$ "	.025	18	\$ 8.00
103	10"	$\frac{1}{2}$ "	.025	18	10.00
103	12"	$\frac{1}{2}$ "	.025	18	12.00
102	8"	$\frac{1}{16}$ "	.025	24	8.00
102	10"	$\frac{1}{2}$ "	.025	24	10.00
102	12"	$\frac{1}{2}$ "	.025	24	12.00
253	8"	$\frac{1}{16}$ "	.025	32	8.00
253	10"	$\frac{1}{2}$ "	.025	32	10.00
253	12"	$\frac{1}{2}$ "	.025	32	12.00
103B	10"	$\frac{1}{2}$ "	.025	14	10.00
103B	12"	$\frac{1}{2}$ "	.025	14	12.00
103A14	12"	$\frac{9}{16}$ "	.025	14	13.50
*103A18	12"	$\frac{9}{16}$ "	.025	18	13.50
103A24	12"	$\frac{9}{16}$ "	.025	24	13.50

14 Teeth—For cutting soft steel, cast iron, bronze, etc.

18 Teeth—For cutting tool steel and light structural shapes, also high carbon and high-speed steel.

24 Teeth—For cutting iron pipe, heavy tubing, copper, drill rod, etc.

32 Teeth—For cutting thin tubing, thin sheet metals, etc.

***No. 103A18—Specially suited for cutting Rails and general service around Railway Shops.**

Packed $\frac{1}{2}$ Gross in box.

Order by Catalog Number and Size.

Tungsten Alloy Steel Hack Saw Blades



Flexible Back

PRICE LIST—Hand Frame Sizes

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
250	8"	$\frac{1}{16}$ "	.025	18	\$ 8.00
250	10"	$\frac{1}{2}$ "	.025	18	10.00
250	12"	$\frac{1}{2}$ "	.025	18	12.00
*252	8"	$\frac{1}{16}$ "	.025	24	8.00
*252	10"	$\frac{1}{2}$ "	.025	24	10.00
*252	12"	$\frac{1}{2}$ "	.025	24	12.00
258	8"	$\frac{1}{16}$ "	.025	32	8.00
258	10"	$\frac{1}{2}$ "	.025	32	10.00
258	12"	$\frac{1}{2}$ "	.025	32	12.00
250D	10"	$\frac{1}{2}$ "	.025	14	10.00
250D	12"	$\frac{1}{2}$ "	.025	14	12.00
250A14	12"	$\frac{9}{16}$ "	.025	14	13.50
250A18	12"	$\frac{9}{16}$ "	.025	18	13.50
250A24	12"	$\frac{9}{16}$ "	.025	24	13.50

STARRETT Flexible Back Blades are superior for cutting in strained or awkward positions. Teeth only are hardened.

14 Teeth—For cutting soft steel, cast iron, bronze, etc.

18 Teeth—For cutting tool steels, high speed steels and small solids.

24 Teeth—For cutting brass, iron pipe, heavy tubing, BX and electrical conduit.

32 Teeth—For cutting very thin tubing, light BX, thin sheet metals, flush pipe, etc.

*No. 252—THE PROPER SAW FOR THE GARAGE MECHANIC.

Packed $\frac{1}{2}$ Gross in box.

Order by Catalog Number and Size.

Tungsten Alloy Steel Hack Saw Blades



All Hard PRICE LIST—Light Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
112A14	12"	$\frac{5}{8}$ "	.032	14	\$16.20
112A18	12"	$\frac{5}{8}$ "	.032	18	16.20
114	12"	$\frac{3}{4}$ "	.032	14	19.44
114	14"	$\frac{3}{4}$ "	.032	14	22.68
115B	12"	$\frac{3}{4}$ "	.032	18	19.44

For use in light power machines.

14 Teeth—For cutting tool steel, wrought iron, cast iron, copper and brass solids.

18 Teeth—For cutting iron pipe, heavy tubing, thin wall stock, etc.

Packed $\frac{1}{2}$ Gross in box.

All Hard PRICE LIST—Medium Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
255C	12"	$\frac{3}{4}$ "	.049	10	\$24.48
255C	14"	$\frac{3}{4}$ "	.049	10	28.56
255	12"	$\frac{3}{4}$ "	.049	14	24.48
255	14"	$\frac{3}{4}$ "	.049	14	28.56

For use in medium weight power machines.

10 Teeth—For cutting cast iron, machine steel and bronze.

14 Teeth—For cutting stock, tool steel, wrought iron, cast iron, copper and brass solids all of small diameter; also thin wall stock.

Packed $\frac{1}{4}$ Gross in box.

Tungsten Alloy Steel Hack Saw Blades



All Hard

PRICE LIST—Heavy Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
254B	12"	1"	.049	10	\$32.64
254B	14"	1"	.049	10	38.08
254B	17"	1"	.049	10	46.24
254A	12"	1"	.049	14	32.64
254A	14"	1"	.049	14	38.08
254A	17"	1"	.049	14	46.24

10 Teeth—For cutting cold rolled and machinery steel, shafting, etc.

14 Teeth—For cutting tool steel, high speed steel, etc.

Packed $\frac{1}{3}$ Gross in box.

All Hard

PRICE LIST—Extra Heavy Power Machine Sizes.

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
952C	14"	1 $\frac{1}{4}$ "	.065	10	\$58.80
952C	17"	1 $\frac{1}{4}$ "	.065	10	71.40
952C	18"	1 $\frac{1}{4}$ "	.065	10	75.60

10 Teeth—For cutting tool steel, cast iron, rails, etc.

Packed $\frac{1}{4}$ Gross in box.

For longer lengths, 1 $\frac{1}{2}$ " wide, see next page.

Tungsten Alloy Steel Hack Saw Blades



All Hard

PRICE LIST—Extra Heavy Power Machine Sizes.
(continued)

Cat. No.	Length	Width	Approx. Thickness	Teeth per Inch	List Price per Gross
955C	21"	1½"	.065	10	\$105.84
955C	24"	1½"	.065	10	120.96

10 Teeth—For cutting tool steel, cast iron, rails, etc.

Packed ¼ Gross in box.

Note: On account of the additional width of these saws, increased weight may be added, resulting in faster cutting time.

In using power machine blades, first determine if machine is of draw-cut or push-stroke type, then insert blade accordingly, having the rake of teeth in the direction in which the cutting is done.

Strain the saw tightly in the frame.

Consider carefully the shape and type of material to be cut before selecting the saw blade to obtain the greatest efficiency.

Order by Catalog Number and Size.

STARRETT HACK SAW BLADES

THE GREATEST ECONOMY OBTAINED BY SELECTING THE CORRECT PITCH

CORRECT

PLENTY OF CHIP
CLEARANCE

14 TEETH PER INCH

FOR MILD MATERIAL
LARGE SECTIONS

INCORRECT

FINE PITCH. NO CHIP
CLEARANCE. TEETH CLOSEDPLENTY OF CHIP
CLEARANCE

18 TEETH PER INCH

FOR TOOL STEEL, HIGH CARBON
& HIGH SPEED STEELFINE PITCH. NO CHIP
CLEARANCE. TEETH CLOSEDTWO TEETH & MORE
ON SECTION

24 TEETH PER INCH

FOR ANGLE IRON, BRASS,
COPPER, IRON PIPE & ETC.COARSE PITCH
STRADDLES WORK
STRIPPING TEETHTWO OR MORE TEETH
ON SECTION

32 TEETH PER INCH

FOR CONDUIT & OTHER THIN
TUBING. SHEET METAL WORKCOARSE PITCH
STRADDLES WORKFOR GENERAL ALL ROUND WORK
IN HAND FRAMES WE RECOMMEND
18 TEETH PER INCH



For any metal cutting job use Starrett Hack Saws



Screw Slotting Saw Blades No. 249



These blades are made for cutting slots in screw heads and can be used in any adjustable or 8 inch hack saw frame. They are hardened throughout, and taper in thickness from the teeth to the back, thus providing good clearance, which prevents binding and allows the blades to cut easily and quickly.

All blades are 8 inches long by $\frac{1}{2}$ inch wide. They are made in four different thicknesses, covering a wide range of work, and will be found invaluable in any machine shop or garage.

Packed three dozen of one thickness in a box, also in sets of four, consisting of one blade of each thickness, twelve sets to a carton.

Furnished with either 14 or 24 teeth to the inch. Specify which is wanted when ordering. 14 teeth sent unless otherwise ordered.

24 teeth commonly used for Pistons.

	Approximate Thickness at Teeth	PRICES	
		Per Dozen	Per Gross
No. 249 A	.049 inch	\$2.10	\$25.20
No. 249 B	.065 "	2.40	28.80
No. 249 C	.083 "	2.70	32.40
No. 249 D	.109 "	3.00	36.00
No. 249 E	Set of four blades, one of each thickness, per set.		.85

Different Standards for Wire Gages in use in the United States

Dimensions of Sizes in Decimal Parts of an Inch

Number of Wire Gage	American, or Brown & Sharpe	Birmingham, or Stubbs' Iron Wire	Washburn & Moen, Worcester, Mass.	W. & M. Steel Music Wire	New American S & W Co.'s Music Wire Gage	Imperial Wire Gage	Stubbs' Steel Wire	U.S. Standard Gage for Sheet and Plate Iron and Steel	Number of Wire Gage
00000000				.0083					00000000
00000000				.0087					00000000
000000				.0095	.004	.464		.46875	000000
00000				.010	.005	.432		.4375	00000
0000	.460	.454	.3938	.011	.006	.400		.40625	0000
000	.40964	.425	.3625	.012	.007	.372		.375	000
00	.3648	.380	.3310	.0133	.008	.348		.34375	00
0	.32486	.340	.3065	.0144	.009	.324		.3125	0
1	.2893	.300	.2830	.0156	.010	.300	.227	.28125	1
2	.25763	.284	.2625	.0166	.011	.276	.219	.265625	2
3	.22942	.259	.2437	.0178	.012	.252	.212	.250	3
4	.20431	.238	.2253	.0188	.013	.232	.207	.234375	4
5	.18194	.220	.2070	.0202	.014	.212	.204	.21875	5
6	.16202	.203	.1920	.0215	.016	.192	.201	.203125	6
7	.14428	.180	.1770	.023	.018	.176	.199	.1875	7
8	.12849	.165	.1620	.0243	.020	.160	.197	.171875	8
9	.11443	.148	.1483	.0256	.022	.144	.194	.15625	9
10	.10189	.134	.1350	.027	.024	.128	.191	.140625	10
11	.090742	.120	.1205	.0284	.026	.116	.188	.125	11
12	.080808	.109	.1055	.0296	.029	.104	.185	.109375	12
13	.071961	.095	.0915	.0314	.031	.092	.182	.09375	13
14	.064084	.083	.0800	.0326	.033	.080	.180	.078125	14
15	.057068	.072	.0720	.0345	.035	.072	.178	.0703125	15
16	.05082	.065	.0625	.036	.037	.064	.175	.0625	16
17	.045257	.058	.0540	.0377	.039	.056	.172	.05625	17
18	.040303	.049	.0475	.0395	.041	.048	.168	.050	18
19	.03589	.042	.0410	.0414	.043	.040	.164	.04375	19
20	.031961	.035	.0348	.0434	.045	.036	.161	.0375	20
21	.028462	.032	.03175	.046	.047	.032	.157	.034375	21
22	.025347	.028	.0286	.0483	.049	.028	.155	.03125	22
23	.022571	.025	.0258	.051	.051	.024	.153	.028125	23
24	.0201	.022	.0230	.055	.055	.022	.151	.025	24
25	.0179	.020	.0204	.0586	.059	.020	.148	.021875	25
26	.01594	.018	.0181	.0626	.063	.018	.146	.01875	26
27	.014195	.016	.0173	.0658	.067	.0164	.143	.0171875	27
28	.012641	.014	.0162	.072	.071	.0149	.139	.015625	28
29	.011257	.013	.0150	.076	.075	.0136	.134	.0140625	29
30	.010025	.012	.0140	.080	.080	.0124	.127	.0125	30
31	.008928	.010	.0132		.085	.0116	.120	.0109375	31
32	.00795	.009	.0128		.090	.0108	.115	.01015625	32
33	.00708	.008	.0118		.095	.0100	.112	.009375	33
34	.006304	.007	.0104			.0092	.110	.00859375	34
35	.0055614	.005	.0095			.0084	.108	.0078125	35
36	.005	.004	.0090			.0076	.106	.00703125	36
37	.004453					.0068	.103	.00640625	37
38	.003965					.0060	.101	.00625	38
39	.003531					.0052	.099		39
40	.003144					.0048	.097		40

Table of Decimal Equivalents

of

8ths, 16ths, 32ds, and 64ths of an inch

8ths	$\frac{5}{32} = .15625$	$\frac{17}{64} = .265625$
$\frac{1}{8} = .125$	$\frac{7}{32} = .21875$	$\frac{19}{64} = .296875$
$\frac{1}{4} = .250$	$\frac{9}{32} = .28125$	$\frac{21}{64} = .328125$
$\frac{3}{8} = .375$	$\frac{11}{32} = .34375$	$\frac{23}{64} = .359375$
$\frac{1}{2} = .500$	$\frac{13}{32} = .40625$	$\frac{25}{64} = .390625$
$\frac{5}{8} = .625$	$\frac{15}{32} = .46875$	$\frac{27}{64} = .421875$
$\frac{3}{4} = .750$	$\frac{17}{32} = .53125$	$\frac{29}{64} = .453125$
$\frac{7}{8} = .875$	$\frac{19}{32} = .59375$	$\frac{31}{64} = .484375$
	$\frac{21}{32} = .65625$	$\frac{33}{64} = .515625$
	$\frac{23}{32} = .71875$	$\frac{35}{64} = .546875$
16ths	$\frac{25}{32} = .78125$	$\frac{37}{64} = .578125$
$\frac{1}{16} = .0625$	$\frac{27}{32} = .84375$	$\frac{39}{64} = .609375$
$\frac{3}{16} = .1875$	$\frac{29}{32} = .90625$	$\frac{41}{64} = .640625$
$\frac{5}{16} = .3125$	$\frac{31}{32} = .96875$	$\frac{43}{64} = .671875$
$\frac{7}{16} = .4375$		$\frac{45}{64} = .703125$
$\frac{9}{16} = .5625$	64ths	$\frac{47}{64} = .734375$
$\frac{11}{16} = .6875$	$\frac{1}{64} = .015625$	$\frac{49}{64} = .765625$
$\frac{13}{16} = .8125$	$\frac{3}{64} = .046875$	$\frac{51}{64} = .796875$
$\frac{15}{16} = .9375$	$\frac{5}{64} = .078125$	$\frac{53}{64} = .828125$
	$\frac{7}{64} = .109375$	$\frac{55}{64} = .859375$
32ds	$\frac{9}{64} = .140625$	$\frac{57}{64} = .890625$
$\frac{1}{32} = .03125$	$\frac{11}{64} = .171875$	$\frac{59}{64} = .921875$
$\frac{3}{32} = .09375$	$\frac{13}{64} = .203125$	$\frac{61}{64} = .953125$
	$\frac{15}{64} = .234375$	$\frac{63}{64} = .984375$

Decimal Equivalent of the Numbers of Twist Drill and Steel Wire Gage

No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals
1	.2280	17	.1730	33	.1130	49	.0730	65	.0350
2	.2210	18	.1695	34	.1110	50	.0700	66	.0330
3	.2130	19	.1660	35	.1100	51	.0670	67	.0320
4	.2090	20	.1610	36	.1065	52	.0635	68	.0310
5	.2055	21	.1590	37	.1040	53	.0595	69	.0292
6	.2040	22	.1570	38	.1015	54	.0550	70	.0280
7	.2010	23	.1540	39	.0995	55	.0520	71	.0260
8	.1990	24	.1520	40	.0980	56	.0465	72	.0250
9	.1960	25	.1495	41	.0960	57	.0430	73	.0240
10	.1935	26	.1470	42	.0935	58	.0420	74	.0225
11	.1910	27	.1440	43	.0890	59	.0410	75	.0210
12	.1890	28	.1405	44	.0860	60	.0400	76	.0200
13	.1850	29	.1360	45	.0820	61	.0390	77	.0180
14	.1820	30	.1285	46	.0810	62	.0380	78	.0160
15	.1800	31	.1200	47	.0785	63	.0370	79	.0145
16	.1770	32	.1160	48	.0760	64	.0360	80	.0135

Table of Decimal Equivalents

of

Millimeters and Fractions of Millimeters

1/100 mm. = .0003937 inch

mm.	inches	mm.	inches	mm.	inches
1/50 = .00079		26/50 = .02047		2 = .07874	
2/50 = .00157		27/50 = .02126		3 = .11811	
3/50 = .00236		28/50 = .02205		4 = .15748	
4/50 = .00315		29/50 = .02283		5 = .19685	
5/50 = .00394		30/50 = .02362		6 = .23622	
6/50 = .00472		31/50 = .02441		7 = .27559	
7/50 = .00551		32/50 = .02520		8 = .31496	
8/50 = .00630		33/50 = .02598		9 = .35433	
9/50 = .00709		34/50 = .02677		10 = .39370	
10/50 = .00787		35/50 = .02756		11 = .43307	
11/50 = .00866		36/50 = .02835		12 = .47244	
12/50 = .00945		37/50 = .02913		13 = .51181	
13/50 = .01024		38/50 = .02992		14 = .55118	
14/50 = .01102		39/50 = .03071		15 = .59055	
15/50 = .01181		40/50 = .03150		16 = .62992	
16/50 = .01260		41/50 = .03228		17 = .66929	
17/50 = .01339		42/50 = .03307		18 = .70866	
18/50 = .01417		43/50 = .03386		19 = .74803	
19/50 = .01496		44/50 = .03465		20 = .78740	
20/50 = .01575		45/50 = .03543		21 = .82677	
21/50 = .01654		46/50 = .03622		22 = .86614	
22/50 = .01732		47/50 = .03701		23 = .90551	
23/50 = .01811		48/50 = .03780		24 = .94488	
24/50 = .01890		49/50 = .03858		25 = .98425	
25/50 = .01969		1 = .03937		26 = 1.02362	

10 mm. = 1 centimeter = 0.3937 inch

10 cm. = 1 decimeter = 3.937 inches

10 dm. = 1 meter = 39.37 inches

25.4 mm. = 1 English inch.

Allowances for Fits

(Newall Engineering Co.)
From Machinery's Handbook (Fifth Edition)

Class	Tolerances in Standard Holes*						
	Nominal Diameters	Up to $\frac{1}{8}$ "	$\frac{1}{8}$ "-1"	1 $\frac{1}{8}$ "-2"	2 $\frac{1}{8}$ "-3"	3 $\frac{1}{8}$ "-4"	4 $\frac{1}{8}$ "-5"
A	High Limit	+0.0002	+0.0005	+0.0007	+0.0010	+0.0010	+0.0010
	Low Limit	-0.0002	-0.0002	-0.0002	-0.0005	-0.0005	-0.0005
	Tolerance	0.0004	0.0007	0.0009	0.0015	0.0015	0.0015
B	High Limit	+0.0005	+0.0007	+0.0010	+0.0012	+0.0015	+0.0017
	Low Limit	-0.0005	-0.0005	-0.0005	-0.0007	-0.0007	-0.0007
	Tolerance	0.0010	0.0012	0.0015	0.0019	0.0022	0.0024

Allowances for Forced Fits							
F	High Limit	+0.0010	+0.0020	+0.0040	+0.0060	+0.0080	+0.0100
	Low Limit	+0.0005	+0.0015	+0.0030	+0.0045	+0.0060	+0.0080
	Tolerance	0.0005	0.0005	0.0010	0.0015	0.0020	0.0020

Allowances for Driving Fits							
D	High Limit	+0.0005	+0.0010	+0.0015	+0.0025	+0.0030	+0.0035
	Low Limit	+0.0002	+0.0007	+0.0010	+0.0015	+0.0020	+0.0025
	Tolerance	0.0003	0.0003	0.0005	0.0010	0.0010	0.0010

Allowances for Push Fits							
P	High Limit	-0.0002	-0.0002	-0.0002	-0.0005	-0.0005	-0.0005
	Low Limit	-0.0007	-0.0007	-0.0007	-0.0010	-0.0010	-0.0010
	Tolerance	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

Allowances for Running Fits†							
X	High Limit	-0.0010	-0.0012	-0.0017	-0.0020	-0.0025	-0.0030
	Low Limit	-0.0020	-0.0027	-0.0035	-0.0042	-0.0050	-0.0057
	Tolerance	0.0010	0.0015	0.0018	0.0022	0.0025	0.0027
Y	High Limit	-0.0007	-0.0010	-0.0012	-0.0015	-0.0020	-0.0022
	Low Limit	-0.0012	-0.0020	-0.0025	-0.0030	-0.0035	-0.0040
	Tolerance	0.0005	0.0010	0.0013	0.0015	0.0015	0.0018
Z	High Limit	-0.0005	-0.0007	-0.0007	-0.0010	-0.0010	-0.0012
	Low Limit	-0.0007	-0.0012	-0.0015	-0.0020	-0.0022	-0.0025
	Tolerance	0.0002	0.0005	0.0008	0.0010	0.0012	0.0013

Formulas for Determining Allowances

Class	High Limit	Low Limit	Class	High Limit	Low Limit
A	$+\sqrt{D} \times 0.0006$	$-\sqrt{D} \times 0.0003$	X	$-\sqrt{D} \times 0.00125$	$-\sqrt{D} \times 0.0025$
B	$+\sqrt{D} \times 0.0008$	$-\sqrt{D} \times 0.0004$	Y	$-\sqrt{D} \times 0.001$	$-\sqrt{D} \times 0.0018$
P	$-\sqrt{D} \times 0.0002$	$-\sqrt{D} \times 0.0006$	Z	$-\sqrt{D} \times 0.0005$	$-\sqrt{D} \times 0.001$

*Tolerance is provided for holes, which ordinary standard reamers can produce, in two grades, Class A and B, the selection of which is a question for the user's decision and dependent upon the quality of the work required; some prefer to use Class A as working limits and Class B as inspection limits.

†Running fits, which are the most commonly required, are divided into three grades: Class X for engine and other work where easy fits are wanted; Class Y for high speeds and good average machine work; Class Z for fine tool work.

Tapers and Angles

Taper per Foot	Included ◁			With Center Line ◁			Taper Per Inch	Taper per Inch from Center Line
	Deg.	Min.	Sec.	Deg.	Min.	Sec.		
$\frac{1}{8}$	0	35	48	0	17	54	.010416	.005203
$\frac{1}{16}$	0	53	44	0	26	52	.015625	.007812
$\frac{3}{4}$	1	11	36	0	35	48	.020833	.010416
$\frac{1}{12}$	1	29	30	0	44	45	.026042	.013021
$\frac{3}{8}$	1	47	24	0	53	42	.031250	.015625
$\frac{1}{8}$	2	5	18	1	2	39	.036458	.018229
$\frac{1}{2}$	2	23	10	1	11	35	.041667	.020833
$\frac{5}{16}$	2	41	4	1	20	32	.046875	.023438
$\frac{3}{8}$	2	59	42	1	29	51	.052084	.026042
$\frac{11}{16}$	3	16	54	1	38	27	.057292	.028646
$\frac{1}{4}$	3	34	44	1	47	22	.062500	.031250
$\frac{9}{16}$	3	52	38	1	56	19	.067708	.033854
$\frac{3}{4}$	4	10	32	2	5	16	.072917	.036456
$\frac{11}{8}$	4	28	24	2	14	12	.078125	.039063
1	4	46	18	2	23	9	.083330	.041667
$1\frac{1}{4}$	5	57	48	2	58	54	.104666	.052084
$1\frac{1}{2}$	7	9	10	3	34	35	.125000	.062500
$1\frac{3}{4}$	8	20	26	4	10	13	.145833	.072917
2	9	31	36	4	45	48	.166666	.083332
$2\frac{1}{2}$	11	53	36	5	56	48	.208333	.104166
3	14	15	0	7	7	30	.250000	.125000
$3\frac{1}{2}$	16	35	40	8	17	50	.291666	.145833
4	18	55	28	9	27	44	.333333	.166666
$4\frac{1}{2}$	21	14	2	10	37	1	.375000	.187500
5	23	32	12	11	46	6	.416666	.208333
6	28	4	2	14	2	1	.500000	.250000

Sizes of Tap Drills

For Taps with "V" Thread

Diam. Tap in Ins.	Thds per In.	Size of Drill No.	Diam. Tap in Ins.	Thds per In.	Size of Drill	Diam. Tap in Ins.	Thds per In.	Size of Drill Ins.	Diam. Tap in Ins.	Thds per In.	Size of Drill Ins.
$\frac{2}{32}$	48	50	$\frac{7}{64}$	24	No. 20	$\frac{19}{32}$	12	$\frac{21}{64}$	$\frac{17}{32}$	7	$\frac{11}{64}$
$\frac{3}{32}$	52	50	$\frac{7}{32}$	28	No. 17	$\frac{19}{32}$	14	$\frac{1}{2}$	$\frac{17}{64}$	8	$\frac{13}{64}$
$\frac{3}{32}$	54	49	$\frac{7}{64}$	30	No. 16	$\frac{9}{16}$	10	$\frac{21}{64}$	$\frac{13}{16}$	7	$\frac{13}{64}$
$\frac{3}{32}$	56	49	$\frac{7}{32}$	32	No. 15	$\frac{9}{16}$	11	$\frac{1}{2}$	$\frac{19}{32}$	7	$\frac{16}{64}$
$\frac{3}{32}$	60	48	$\frac{16}{64}$	24	No. 16	$\frac{9}{16}$	12	$\frac{32}{64}$	$\frac{16}{16}$	7	$\frac{17}{64}$
$\frac{7}{64}$	32	50	$\frac{16}{64}$	28	No. 12	$\frac{21}{32}$	10	$\frac{32}{64}$	$\frac{111}{32}$	7	$\frac{19}{64}$
$\frac{7}{64}$	36	49	$\frac{16}{64}$	32	No. 10	$\frac{21}{32}$	11	$\frac{17}{32}$	$\frac{1}{2}$	6	$\frac{1}{16}$
$\frac{7}{64}$	40	47	$\frac{1}{4}$	18	No. 17	$\frac{21}{32}$	12	$\frac{36}{64}$	$\frac{115}{32}$	6	$\frac{16}{32}$
$\frac{7}{64}$	48	44	$\frac{1}{4}$	20	No. 14	$\frac{11}{16}$	11	$\frac{9}{16}$	$\frac{17}{16}$	6	$\frac{13}{16}$
$\frac{7}{64}$	56	43	$\frac{1}{4}$	24	No. 9	$\frac{11}{16}$	12	$\frac{67}{64}$	$\frac{116}{32}$	6	$\frac{17}{32}$
$\frac{1}{8}$	32	44	$\frac{9}{32}$	16	No. 10	$\frac{25}{64}$	11	$\frac{19}{32}$	$\frac{1}{2}$	6	$\frac{117}{64}$
$\frac{1}{8}$	36	43	$\frac{9}{32}$	18	$\frac{12}{64}$ in.	$\frac{25}{64}$	12	$\frac{39}{64}$	$\frac{117}{32}$	6	$\frac{119}{64}$
$\frac{1}{8}$	40	42	$\frac{9}{32}$	20	No. 3	$\frac{1}{4}$	10	$\frac{39}{64}$	$\frac{19}{16}$	6	$\frac{121}{64}$
$\frac{1}{8}$	42	41	$\frac{6}{16}$	16	No. 1	$\frac{1}{4}$	11	$\frac{119}{32}$	$\frac{1}{2}$	6	$\frac{123}{64}$
$\frac{1}{8}$	48	39	$\frac{6}{16}$	18	$\frac{16}{64}$ in.	$\frac{1}{4}$	12	$\frac{41}{64}$	$\frac{1}{2}$	5	$\frac{121}{64}$
$\frac{9}{64}$	30	41	$\frac{11}{32}$	16	F	$\frac{26}{64}$	10	$\frac{41}{64}$	$\frac{1}{2}$	$5\frac{1}{2}$	$\frac{122}{64}$
$\frac{9}{64}$	32	40	$\frac{11}{32}$	18	$\frac{17}{64}$ in.	$\frac{26}{64}$	11	$\frac{21}{32}$	$\frac{121}{32}$	5	$\frac{123}{64}$
$\frac{9}{64}$	36	37	$\frac{1}{4}$	14	J	$\frac{26}{64}$	12	$\frac{42}{64}$	$\frac{121}{32}$	$5\frac{1}{2}$	$\frac{126}{64}$
$\frac{9}{64}$	40	34	$\frac{1}{4}$	16	L	$\frac{12}{16}$	10	$\frac{42}{64}$	$\frac{111}{16}$	5	$\frac{126}{64}$
$\frac{6}{32}$	30	33	$\frac{1}{8}$	18	$\frac{19}{64}$ in.	$\frac{27}{32}$	10	$\frac{46}{64}$	$\frac{111}{16}$	$5\frac{1}{2}$	$\frac{127}{64}$
$\frac{6}{32}$	32	32	$\frac{13}{32}$	14	N	$\frac{1}{8}$	9	$\frac{23}{32}$	$\frac{123}{32}$	5	$\frac{127}{64}$
$\frac{6}{32}$	36	31	$\frac{13}{32}$	16	P	$\frac{1}{8}$	10	$\frac{47}{64}$	$\frac{123}{32}$	$5\frac{1}{2}$	$\frac{129}{64}$
$\frac{6}{32}$	40	30	$\frac{13}{32}$	18	$\frac{21}{64}$ in.	$\frac{29}{64}$	9	$\frac{1}{4}$	$\frac{1}{2}$	5	$\frac{129}{64}$
$\frac{11}{64}$	32	30	$\frac{7}{16}$	14	R	$\frac{16}{16}$	9	$\frac{25}{32}$	$\frac{126}{64}$	5	$\frac{131}{64}$
$\frac{11}{64}$	36	29	$\frac{7}{16}$	16	S	$\frac{21}{32}$	9	$\frac{12}{16}$	$\frac{113}{16}$	5	$\frac{133}{64}$
$\frac{11}{64}$	40	28	$\frac{16}{32}$	14	$\frac{1}{8}$	1	8	$\frac{63}{64}$	$\frac{127}{32}$	5	$\frac{126}{64}$
$\frac{3}{16}$	24	29	$\frac{16}{32}$	16	W	$\frac{11}{32}$	8	$\frac{66}{64}$	$\frac{1}{2}$	$4\frac{1}{2}$	$\frac{136}{64}$
$\frac{2}{16}$	28	28	$\frac{1}{2}$	12	$\frac{26}{64}$ in.	$\frac{11}{16}$	8	$\frac{67}{64}$	$\frac{1}{2}$	5	$\frac{137}{64}$
$\frac{3}{16}$	30	27	$\frac{1}{2}$	13	X	$\frac{12}{32}$	8	$\frac{69}{64}$	$\frac{129}{32}$	$4\frac{1}{2}$	$\frac{137}{64}$
$\frac{3}{16}$	32	26	$\frac{1}{2}$	14	$\frac{12}{32}$ in.	$\frac{1}{8}$	7	$\frac{69}{64}$	$\frac{129}{32}$	5	$\frac{160}{64}$
$\frac{3}{16}$	36	24	$\frac{17}{32}$	12	$\frac{27}{64}$ in.	$\frac{1}{8}$	8	$\frac{61}{64}$	$\frac{116}{16}$	$4\frac{1}{2}$	$\frac{129}{64}$
$\frac{12}{64}$	24	26	$\frac{17}{32}$	13	$\frac{27}{64}$ in.	$\frac{16}{32}$	7	$\frac{61}{64}$	$\frac{116}{16}$	5	$\frac{141}{64}$
$\frac{12}{64}$	28	22	$\frac{17}{32}$	14	$\frac{7}{16}$ in.	$\frac{16}{32}$	8	$\frac{63}{64}$	$\frac{121}{32}$	$4\frac{1}{2}$	$\frac{141}{64}$
$\frac{12}{64}$	32	20	$\frac{9}{16}$	12	$\frac{29}{64}$ in.	$\frac{18}{16}$	7	$\frac{63}{64}$	$\frac{121}{32}$	5	$\frac{143}{64}$
$\frac{12}{64}$	36	18	$\frac{9}{16}$	14	$\frac{16}{32}$ in.	$\frac{18}{16}$	8	$\frac{11}{64}$	2	$4\frac{1}{2}$	$\frac{143}{64}$

Sizes of Tap Drills

For Taps with U. S. Standard Threads

Diam. Tap, in Ins.	Thds. per in.	Size of Drill Ins.	Diam. Tap, in Ins.	Thds. per in.	Size of Drill Ins.	Diam. Tap, in Ins.	Thds. per in.	Size of Drill Ins.	Diam. Tap, in Ins.	Thds. per in.	Size of Drill Ins.
$\frac{1}{8}$	20	$\frac{1}{8}$	$\frac{11}{16}$	11	$\frac{17}{16}$	$\frac{1}{4}$	7	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{17}{16}$
$\frac{1}{4}$	18	$\frac{1}{4}$	$\frac{13}{16}$	10	$\frac{19}{16}$	$\frac{1}{2}$	6	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{19}{16}$
$\frac{3}{8}$	16	$\frac{1}{2}$	$\frac{15}{16}$	10	$\frac{21}{16}$	$\frac{3}{4}$	6	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{21}{16}$
$\frac{7}{16}$	14	$\frac{3}{4}$	$\frac{17}{16}$	9	$\frac{23}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{23}{16}$
$\frac{1}{2}$	13	$\frac{7}{8}$	$\frac{19}{16}$	9	$\frac{25}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{25}{16}$
$\frac{9}{16}$	12	$\frac{1}{2}$	$\frac{21}{16}$	8	$\frac{27}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{27}{16}$
$\frac{5}{8}$	11	$\frac{1}{2}$	$\frac{23}{16}$	7	$\frac{29}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{29}{16}$

For Machine Screw Taps

Size of Tap, No.	Size of Drill, No.	Size of Tap, No.	Size of Drill, No.	Size of Tap, No.	Size of Drill, No.	Size of Tap, No.	Size of Drill, No.
2 x 48	50	7 x 32	30	13 x 20	15	18 x 20	A
2 x 56	49	8 x 24	30	13 x 22	15	19 x 16	B
2 x 64	48	8 x 30	30	13 x 24	13	19 x 18	C
3 x 40	47	8 x 32	29	14 x 20	13	19 x 20	D
3 x 48	45	9 x 24	29	14 x 22	11	20 x 16	D
3 x 56	44	9 x 28	28	14 x 24	9	20 x 18	F
4 x 32	43	9 x 30	27	15 x 18	10	20 x 20	H
4 x 36	42	9 x 32	25	15 x 20	8	22 x 16	J
4 x 40	41	10 x 24	25	15 x 22	6	22 x 18	L
5 x 30	40	10 x 30	22	15 x 24	5	24 x 14	M
5 x 32	40	10 x 32	21	16 x 16	7	24 x 16	N
5 x 36	38	11 x 24	21	16 x 18	6	24 x 18	O
5 x 40	37	11 x 28	17	16 x 20	5	26 x 14	O
6 x 30	35	11 x 30	17	17 x 16	6	26 x 16	P
6 x 32	35	12 x 20	19	17 x 18	2	28 x 14	R
6 x 36	33	12 x 22	17	17 x 20	2	28 x 16	S
6 x 40	32	12 x 24	17	18 x 16	2	30 x 14	U
7 x 28	32	12 x 28	15	18 x 18	1	30 x 16	V
7 x 30	31						

For Steel work use one or two sizes of drills larger than listed above.

Sizes of Drills for Pipe Taps

Briggs' Standard

Reamers should be used for the larger sizes.

$\frac{1}{4}$ — $\frac{11}{16}$	$\frac{1}{2}$ — $\frac{1}{2}$	$\frac{3}{4}$ — $\frac{11}{16}$	$1\frac{1}{4}$ — $1\frac{1}{4}$	2 — $2\frac{1}{4}$	3— $3\frac{1}{4}$
$\frac{1}{2}$ — $\frac{1}{2}$	$\frac{1}{2}$ — $\frac{11}{16}$	1 — $1\frac{1}{4}$	$1\frac{1}{2}$ — $1\frac{1}{2}$	$2\frac{1}{2}$ — $2\frac{1}{2}$	

Letter Sizes of Drills

Diameter Inches	Decimals of 1 Inch	Diameter Inches	Decimals of 1 Inch
A $\frac{1}{8}$ / ₆₄	.234	N	.302
B	.238	O $\frac{5}{16}$	.316
C	.242	P $\frac{3}{8}$ / ₆₄	.323
D	.246	Q	.332
E $\frac{1}{4}$	.250	R $\frac{11}{32}$	.339
F	.257	S	.348
G	.261	T $\frac{3}{8}$ / ₆₄	.358
H $\frac{17}{64}$	.266	U	.368
I	.272	V $\frac{7}{8}$	.377
J	.277	W $\frac{3}{8}$ / ₆₄	.386
K $\frac{9}{32}$	.281	X	.397
L	.290	Y $\frac{1}{2}$ / ₃₂	.404
M $\frac{1}{2}$ / ₆₄	.295	Z	.413

High Temperatures Judged by Color, and Colors for Tempering

De- grees Cen- ti- grade	De- grees Fah- renheit	High Temperatures judged by Color	De- grees Cen- ti- grade	De- grees Fah- ren- heit	Colors for Tempering
400	752	Red heat, visible in the dark.	221.1	430	Very pale yellow
474	885	Red heat, visible in the twilight.	226.7	440	Light yellow
525	975	Red heat, visible in the daylight.	232.2	450	Pale straw-yellow
581	1077	Red heat, visible in the sunlight.	237.8	460	Straw-yellow
700	1292	Dark red	243.3	470	Deep straw-yellow
800	1472	Dull cherry-red	248.9	480	Dark yellow
900	1652	Cherry-red	254.4	490	Yellow-brown
1000	1832	Bright cherry-red	260.0	500	Brown-yellow
1100	2012	Orange-red	265.6	510	Spotted red-brown
1200	2192	Orange-yellow	271.1	520	Brown-purple
1300	2372	Yellow-white	276.7	530	Light purple
1400	2552	White welding heat	282.2	540	Full purple
1500	2732	Brilliant white	287.8	550	Dark purple
1600	2912	Dazzling white (bluish-white)	293.3	560	Full blue
			298.9	570	Dark blue

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Lubricants for Cutting Tools

Material	Turning	Chucking	Drilling Milling	Reaming	Tapping
Tool Steel	Dry or Oil	Oil or Soda Water	Oil	Lard Oil	Oil
Soft Steel	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Wrought Iron	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Cast Iron	Dry	Dry	Dry	Dry	Oil
Brass	Dry	Dry	Dry	Dry	Oil
Copper	Dry	Oil	Oil	Mixture	Oil
Babbitt	Dry	Dry	Dry	Dry	Oil
Glass			Turpentine	or kerosene	

Mixture is $\frac{1}{4}$ Crude Petroleum, $\frac{3}{4}$ Lard Oil. When two lubricants are mentioned the first is preferable.

The Speed of Drills

A feed per revolution of .004 to .007 for drills $\frac{1}{8}$ inch and smaller, and from .007 to .015 for larger is about all that should be required.

This feed is based on a peripheral speed of a drill equal to:

39 feet per minute for steel; 35 feet per minute for iron; 60 feet per minute for brass.

It may also be found advisable to vary the speed somewhat as the material to be drilled is more or less refractory.

We believe that these speeds should not be exceeded under ordinary circumstances.

Table of Cutting Speeds

Feet per Min.	15'	20'	25'	30'	35'	40'	45'	50'	60'	70'	80'
Diam.	REVOLUTIONS PER MINUTE										
$\frac{1}{16}$ in.	917.	1223.	1528.	1834.	2140.	2445.	2751.	3057.	3668.	4280.	4891.
$\frac{1}{8}$	459.	611.	764.	917.	1070.	1222.	1375.	1528.	1834.	2139.	2445.
$\frac{3}{16}$	306.	408.	509.	611.	713.	815.	917.	1019.	1222.	1426.	1630.
$\frac{1}{4}$	229.	306.	382.	458.	535.	611.	688.	764.	917.	1070.	1222.
$\frac{5}{16}$	183.	245.	306.	367.	428.	489.	550.	611.	733.	856.	978.
$\frac{3}{8}$	153.	204.	255.	306.	357.	408.	458.	509.	611.	713.	815.
$\frac{7}{16}$	131.	175.	218.	262.	306.	349.	393.	437.	524.	611.	699.
$\frac{1}{2}$	115.	153.	191.	229.	268.	306.	344.	382.	459.	535.	611.
$\frac{5}{8}$	91.8	123.	153.	184.	214.	245.	276.	306.	367.	428.	489.
$\frac{3}{4}$	76.3	102.	127.	153.	178.	203.	229.	254.	306.	357.	408.
$\frac{7}{8}$	65.5	87.3	109.	131.	153.	175.	196.	219.	262.	306.	349.
1	57.3	76.4	95.5	115.	134.	153.	172.	191.	229.	267.	306
$1\frac{1}{8}$	51.0	68.0	85.0	102.	119.	136.	153.	170.	204.	238.	272.
$1\frac{1}{4}$	45.8	61.2	76.3	91.8	107.	123.	137.	153.	183.	214.	245.
$1\frac{3}{8}$	41.7	55.6	69.5	83.3	97.2	111.	125.	139.	167.	195.	222.
$1\frac{1}{2}$	38.2	50.8	63.7	76.3	89.2	102.	115.	127.	153.	178.	204.
$1\frac{3}{4}$	35.0	47.0	58.8	70.5	82.2	93.9	106.	117.	141.	165.	188.
$1\frac{7}{8}$	32.7	43.6	54.5	65.5	76.4	87.3	98.2	109.	131.	153.	175.
$1\frac{9}{8}$	30.6	40.7	50.9	61.1	71.3	81.5	91.9	102.	122.	143.	163.
2	28.7	38.2	47.8	57.3	66.9	76.4	86.0	95.5	115.	134.	153.
$2\frac{1}{4}$	25.4	34.0	42.4	51.0	59.4	68.0	76.2	85.0	102.	119.	136.
$2\frac{1}{2}$	22.9	30.6	38.2	45.8	53.5	61.2	68.8	76.3	91.7	107.	122.
$2\frac{3}{4}$	20.8	27.8	34.7	41.7	48.6	55.6	62.5	69.5	83.4	97.2	111.
3	19.1	25.5	31.8	38.2	44.6	51.0	57.3	63.7	76.4	89.1	102.

Double Depth of Threads

Threads per in. N	V Threads D D	U. S. St'd D D	Whit. St'd D D	Threads per in. N	V Threads D D	U. S. St'd D D	Whit. St'd D D
2	.86650	.64950	.64000	28	.06185	.04639	.04571
2 1/4	.77022	.57733	.56888	30	.05773	.04330	.04266
2 1/2	.72960	.54694	.53894	32	.05412	.04059	.04000
2 3/4	.69320	.51960	.51200	34	.05097	.03820	.03764
3	.66015	.49485	.48761	36	.04811	.03608	.03555
3 1/4	.63019	.47236	.46545	38	.04560	.03418	.03368
3 1/2	.60278	.45182	.44521	40	.04330	.03247	.03200
3 3/4	.57733	.43300	.42666	42	.04126	.03093	.03047
4	.55323	.39966	.39384	44	.03936	.02952	.03136
4 1/4	.49485	.37114	.36571	46	.03767	.02823	.02782
4 1/2	.43300	.32475	.32000	48	.03608	.02706	.02666
4 3/4	.38488	.28869	.28444	50	.03464	.02598	.02560
5	.34660	.25980	.25600	52	.03332	.02498	.02461
5 1/4	.31490	.23618	.23272	54	.03209	.02405	.02370
5 1/2	.28866	.21650	.21333	56	.03093	.02319	.02285
5 3/4	.24742	.18557	.18285	58	.02987	.02239	.02206
6	.21650	.16237	.16000	60	.02887	.02165	.02133
6 1/4	.19244	.14433	.14222	62	.02795	.02095	.02064
6 1/2	.17320	.12990	.12800	64	.02706	.02029	.02000
6 3/4	.15745	.11809	.11636	66	.02625	.01968	.01939
7	.15069	.11295	.11121	68	.02548	.01910	.01882
7 1/4	.14433	.10825	.10666	70	.02475	.01855	.01728
7 1/2	.13323	.09992	.09846	72	.02407	.01804	.01782
7 3/4	.12357	.09278	.09142	74	.02341	.01752	.01729
8	.11555	.08660	.08533	76	.02280	.01714	.01673
8 1/4	.10825	.08118	.08000	78	.02221	.01665	.01641
8 1/2	.09622	.07216	.07111	80	.02166	.01623	.01600
8 3/4	.08660	.06495	.06400	82	.02113	.01584	.01560
9	.07872	.05904	.05818	84	.02063	.01546	.01523
9 1/4	.07216	.05412	.05333	86	.02015	.01510	.01476
9 1/2	.06661	.04996	.04923	88	.01957	.01476	.01454
9 3/4	.06418	.04811	.04740	90	.01925	.01443	.01422

$$D D = \frac{1.733}{N} \quad \text{For V Thread}$$

$$D D = \frac{1.299}{N} \quad \text{For U. S. Standard}$$

$$D D = \frac{1.28}{N} \quad \text{For Whitworth Standard}$$

Rules Relative to the Circle, etc.

To Find Circumference—

Multiply diameter by 3.1416

Or divide " " 0.3183

To Find Diameter—

Multiply circumference by 0.3183

Or divide " " 3.1416

To Find Radius—

Multiply circumference by 0.15915

Or divide " " 6.28318

To Find Side of an Inscribed Square—

Multiply diameter by 0.7071

Or multiply circumference by 0.2251

" divide " " 4.4428

To Find Side of an Equal Square—

Multiply diameter by 0.8862

Or divide " " 1.1284

" multiply circumference by 0.2821

" divide " " 3.545

SQUARE—

A side multiplied by 1.4142 equals diameter of its circumscribing circle.

A side multiplied by 4.443 equals circumference of its circumscribing circle.

A side multiplied by 1.128 equals diameter of an equal circle.

A side multiplied by 3.547 equals circumference of an equal circle.

Square inches multiplied by 1.273 equal circle inches of an equal circle.

To Find the Area of a Circle—

Multiply circumference by one-quarter of the diameter,

Or " the square of diameter by 0.7854

" " " " circumference " .07958

" " " " $\frac{1}{2}$ diameter " 3.1416

To Find the Surface of a Sphere or Globe—

Multiply the diameter by the circumference.

Or " " square of diameter by 3.1416

" " four times the square of radius " 3.1416

To Find the Weight of Brass and Copper Sheets, Rods and Bars—

Ascertain the number of cubic inches in piece and multiply same by weight per cubic inch.

Brass, 0.2972.

Copper, 0.3212.

Or multiply the length by the breadth (in feet) and product by weight in pounds per square foot.

Metric Conversion Table

Millimeters.....	×	.03937	= Inches	
“	=	25.400	×	“
Meters.....	×	3.2809	= Feet	
“	=	.3048	×	“
Kilometers.....	×	.621377	= Miles	
“	=	1.6093	×	“
Square centimeters.....	×	.15500	= Square inches	
“	=	6.4515	×	“
Square meters.....	×	10.76410	= Square feet	
“	=	.09290	×	“
Square kilometers.....	×	247.1098	= Acres	
“	=	.00405	×	“
Hectares.....	×	2.471	= “	
“	=	.4047	×	“
Cubic centimeters.....	×	.061025	= Cubic inches	
“	=	16.3866	×	“
Cubic meters.....	×	35.3156	= Cubic feet	
“	=	.02832	×	“
“	×	1.308	= Cubic yards	
“	=	.765	×	“
Liters.....	×	61.023	= Cubic inches	
“	=	.01639	×	“
“	×	.26418	= U. S. gallons	
“	=	3.7854	×	“
Grams.....	×	15.4324	= Grains	
“	=	.0648	×	“
“	×	.03527	= ounces, av'dupois	
“	=	28.3495	×	“
Kilograms.....	×	2.2046	= Pounds	
“	=	.4536	×	“
Kilog's per sq. centimeter.....	×	14.2231	= Lbs. per sq. inch	
“	=	.0703	×	“
Kilogram per cubic meter.....	×	.06243	= Lbs. per cubic ft.	
“	=	16.01890	×	“
Metric tons (1,000 kilog's).....	×	1.1023	= Tons (2,000 lbs.)	
“	=	.9072	×	“
Kilowatts.....	×	1.3405	= Horse-powers	
“	=	.746	×	“
Calories.....	×	3.9683	= B. T. units	
“	=	.2520	×	“
Francs.....	×	.193	= Dollars	
“	=	5.18	×	“

By courtesy of the American Machinist, New York.

Tables of Decimal Equivalents

of 7ths, 14ths, and 28ths of an Inch								Of 6ths, 12ths, and 24ths of an Inch							
7th	14th	28th	Dec'l	7th	14th	28th	Dec'l	6th	12th	24th	Dec'l	6th	12th	24th	Dec'l
		1	.035714			15	.535714			1	.041667			13	.541666
	1	3	.071429			17	.571429		1	3	.083333		7	15	.583333
1		5	.107143			19	.607143			5	.125			17	.625
		7	.142857	9		21	.642857	1		7	.166666	4		19	.666666
	3	9	.178571			23	.678571		3	9	.208333		9	21	.708333
		11	.214286	5		25	.714286			11	.25			23	.75
2		13	.25			27	.75	2		13	.291666				.791666
		15	.285714			29	.785714		2	15	.333333	5			.833333
	5	17	.321429			31	.821429			17	.375				.875
		19	.357143	6		33	.857143	5		19	.416666		11		.916666
		21	.392857			35	.892857		5	21	.458333				.958333
3		23	.428571			37	.928571			23	.5				
		25	.464286	13		39	.964286	3		25					
	7	27	.5			41				27					

Tables for Computing Weight of Cast Steel

Weight in lbs. of a Lineal Foot of Round, Square, and Octagon Steel.

Size in Inches	Round	Octagon	Square	Size in Inches	Round	Octagon	Square
1/16	.010	.011	.013	2 1/8	16.79	17.71	21.37
1/8	.042	.044	.053	2 1/4	18.51	19.52	23.56
3/16	.094	.099	.120	2 3/8	20.31	21.42	25.86
1/4	.168	.177	.214	2 1/2	22.20	23.41	28.27
5/16	.262	.277	.334	3	24.17	25.50	30.78
3/8	.378	.398	.481	3 1/8	26.23	27.66	33.40
7/16	.514	.542	.655	3 1/4	28.37	29.92	36.12
1/2	.671	.708	.855	3 3/8	30.59	32.27	38.95
9/16	.850	.896	1.082	3 1/2	32.90	34.70	41.89
5/8	1.049	1.107	1.336	3 3/4	35.29	37.23	44.94
11/16	1.270	1.339	1.616	3 7/8	37.77	39.84	48.09
3/4	1.511	1.594	1.924	4	40.33	42.54	51.35
13/16	1.773	1.870	2.258	4 1/8	42.97	45.33	54.72
15/16	2.056	2.169	2.618	4 1/4	45.51	48.01	58.17
1 1/16	2.361	2.490	3.006	4 3/8	48.09	50.69	61.77
1 1/8	2.686	2.833	3.420	4 1/2	50.71	53.41	65.25
1 1/4	3.399	3.585	4.328	4 3/4	53.37	56.17	68.81
1 3/8	4.197	4.427	5.344	5	56.06	58.96	72.41
1 1/2	5.078	5.356	6.466	5 1/8	58.79	61.79	76.06
1 3/4	6.044	6.374	7.695	5 1/4	61.55	64.65	79.76
1 7/8	7.093	7.481	9.031	5 3/8	64.34	67.54	83.50
1 5/8	8.226	8.674	10.474	6	67.15	70.45	87.30
2	9.443	9.960	12.023	6 1/8	69.99	73.39	91.15
2 1/8	10.744	11.332	13.680	6 1/4	72.86	76.36	95.05
2 1/4	12.129	12.793	15.443	6 3/8	75.76	79.36	99.00
2 3/8	13.598	14.343	17.314	6 1/2	78.69	82.39	103.00
2 1/2	15.151	15.981	19.291	6 3/4	81.65	85.45	107.05

Miscellaneous Measurements

Measures of Length

1 mile = 1760 yards = 5280 feet.

1 yard = 3 feet = 36 inches.

1 foot = 12 inches.

The following measures of length are also used occasionally:

1 mil = 0.001 inch. 1 fathom = 2 yards = 6 feet.

1 rod = 5.5 yards = 16.5 feet. 1 hand = 4 inches. 1 span = 9 inches.

Surveyor's Measure

1 mile = 8 furlongs = 80 chains.

1 furlong = 10 chains = 220 yards.

1 chain = 4 rods = 22 yards = 66 feet = 100 links.

1 link = 7.92 inches.

Nautical Measure

1 league = 3 nautical miles.

1 nautical mile (knot) = 6080.26 feet = 1.1516 statute mile.

One degree at the equator = 60 nautical miles = 69.168 statute miles.

360 degrees = 21,600 nautical miles = 24,874.5 statute miles = circumference of earth at the equator.

Square Measure

1 square mile = 640 acres = 6400 square chains.

1 acre = 10 square chains = 4840 square yards = 43,560 square feet.

1 square chain = 16 square rods = 484 square yards = 4356 square feet.

1 square rod = 30.25 square yards = 272.25 square feet = 625 square links.

1 square yard = 9 square feet.

1 square foot = 144 square inches.

An acre is equal to a square, the side of which is 208.7 feet.

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Tap Drill Sizes

75% Depth of Thread

A bolt inserted in an ordinary nut which has only one-half of a full depth of thread, will break before stripping the thread. Also a full depth of thread, while very difficult to obtain, is only about 5% stronger than a 75% depth.

These tables give the exact size of the hole, expressed in decimals, that will produce a 75% depth of thread, and also the nearest regular stock drill to this size. Holes produced by these drills are considered close enough for any commercial tapping.

$$\text{Diameter of Tap, Minus } \frac{.974}{\text{No. threads per Inch}} = \text{Diameter of Holes.}$$

TAP DRILL SIZES—75% Depth Thread Machine Screw Threads

Tap Size	Thds. per in.	Diam. Hole	Drill	Tap Size	Thds. per in.	Diam. Hole	Drill
0	*80	.048	$\frac{3}{84}$	10	32	.160	21
1	*72	.060	53	10	*30	.158	22
1	64	.058	53	10	24	.149	25
2	*64	.071	50	12	*28	.181	14
2	56	.069	50	12	24	.175	16
3	*56	.082	45	14	*24	.201	7
3	48	.079	47	14	20	.193	10
4	*48	.092	42	16	*22	.224	2
4	40	.088	43	16	20	.219	$\frac{7}{32}$
4	36	.085	44	16	18	.214	3
5	*44	.103	37	18	*20	.245	D
5	40	.101	38	18	18	.240	B
5	36	.098	40	20	*20	.271	I
6	*40	.114	33	20	18	.266	$\frac{17}{64}$
6	36	.111	34	22	*18	.292	L
6	32	.108	36	22	16	.285	$\frac{9}{32}$
7	*36	.124	$\frac{1}{4}$	24	18	.318	O
7	32	.121	31	24	*16	.311	$\frac{5}{16}$
7	30	.119	31	26	*16	.337	R
8	*36	.137	29	26	14	.328	$\frac{21}{64}$
8	32	.134	29	28	16	.353	$\frac{23}{64}$
8	30	.132	30	28	*14	.354	T
9	*32	.147	26	30	16	.389	$\frac{25}{64}$
9	30	.145	27	30	*14	.380	V
9	24	.136	29				

*A. S. M. E. Standard.

TAP DRILL SIZES—75% Depth Thread

U. S. F. and S. A. E. Standard

Tap Size	Thds per"	Diam. Hole	Drill	Tap Size	Thds per"	Diam. Hole	Drill	Tap Size	Thds per"	Diam. Hole	Drill
$\frac{1}{16}$	72	.049	$\frac{3}{64}$	$\frac{1}{4}$	32	.220	$\frac{7}{32}$	$\frac{1}{8}$	*14	.805	$\frac{13}{16}$
$\frac{1}{16}$	64	.047	$\frac{3}{64}$	$\frac{1}{4}$	*28	.215	3	$\frac{1}{8}$	12	.794	$\frac{61}{64}$
$\frac{1}{16}$	60	.046	56	$\frac{1}{4}$	27	.214	3	$\frac{1}{8}$	9	.767	$\frac{49}{64}$
$\frac{5}{64}$	72	.065	52	$\frac{1}{4}$	24	.209	4	$\frac{15}{16}$	12	.856	$\frac{63}{64}$
$\frac{5}{64}$	64	.063	$\frac{1}{16}$	$\frac{1}{4}$	20	.201	7	$\frac{15}{16}$	9	.829	$\frac{53}{64}$
$\frac{5}{64}$	60	.062	$\frac{1}{16}$	$\frac{5}{16}$	32	.282	$\frac{9}{32}$	1	27	.964	$\frac{31}{32}$
$\frac{5}{64}$	56	.061	53	$\frac{5}{16}$	27	.276	J	1	*14	.930	$\frac{15}{16}$
$\frac{5}{32}$	60	.077	$\frac{5}{64}$	$\frac{5}{16}$	*24	.272	I	1	12	.919	$\frac{69}{64}$
$\frac{5}{32}$	56	.076	48	$\frac{5}{16}$	20	.264	$\frac{17}{64}$	$\frac{1}{16}$	8	.878	$\frac{7}{8}$
$\frac{5}{32}$	50	.074	49	$\frac{5}{16}$	18	.258	F	$\frac{1}{16}$	8	.941	$\frac{15}{16}$
$\frac{5}{32}$	48	.073	49	$\frac{3}{8}$	27	.339	R	$\frac{1}{8}$	*12	1.044	$\frac{19}{64}$
$\frac{1}{4}$	56	.092	42	$\frac{3}{8}$	*24	.334	Q	$\frac{1}{16}$	7	.986	$\frac{63}{64}$
$\frac{1}{4}$	50	.090	43	$\frac{3}{8}$	20	.326	$\frac{21}{64}$	$\frac{1}{16}$	7	1.048	$\frac{13}{64}$
$\frac{1}{4}$	48	.089	43	$\frac{3}{8}$	16	.314	$\frac{5}{16}$	$\frac{1}{4}$	*12	1.169	$\frac{111}{64}$
$\frac{1}{8}$	48	.105	36	$\frac{1}{2}$	27	.401	Y	$\frac{1}{4}$	7	1.111	$\frac{17}{64}$
$\frac{1}{8}$	40	.101	38	$\frac{1}{2}$	24	.397	X	$\frac{1}{8}$	7	1.173	$\frac{111}{64}$
$\frac{1}{8}$	36	.098	40	$\frac{1}{2}$	*20	.389	$\frac{25}{64}$	$\frac{1}{8}$	*12	1.294	$\frac{119}{64}$
$\frac{1}{8}$	32	.095	$\frac{5}{32}$	$\frac{1}{2}$	14	.368	U	$\frac{1}{8}$	6	1.213	$\frac{17}{32}$
$\frac{3}{16}$	40	.116	32	$\frac{1}{2}$	27	.464	$\frac{15}{32}$	$\frac{1}{2}$	*12	1.419	$\frac{127}{64}$
$\frac{3}{16}$	36	.114	33	$\frac{1}{2}$	24	.460	$\frac{29}{64}$	$\frac{1}{2}$	6	1.338	$\frac{111}{32}$
$\frac{3}{16}$	32	.110	35	$\frac{1}{2}$	*20	.451	$\frac{29}{64}$	$\frac{1}{8}$	5 1/2	1.448	$\frac{129}{64}$
$\frac{3}{16}$	40	.132	30	$\frac{1}{2}$	13	.425	$\frac{27}{64}$	$\frac{1}{4}$	5	1.555	$\frac{19}{16}$
$\frac{3}{16}$	36	.129	30	$\frac{1}{2}$	12	.419	$\frac{27}{64}$	$\frac{1}{8}$	5	1.680	$\frac{111}{16}$
$\frac{3}{16}$	32	.126	$\frac{1}{8}$	$\frac{1}{2}$	27	.526	$\frac{17}{32}$	$\frac{1}{2}$	4 1/2	1.783	$\frac{125}{32}$
$\frac{11}{64}$	36	.145	27	$\frac{3}{16}$	*18	.508	$\frac{35}{64}$	$\frac{1}{2}$	4 1/2	1.909	$\frac{129}{32}$
$\frac{11}{64}$	32	.141	$\frac{9}{64}$	$\frac{3}{16}$	12	.481	$\frac{31}{64}$	$\frac{1}{4}$	4 1/2	2.034	$\frac{21}{32}$
$\frac{3}{8}$	36	.161	20	$\frac{3}{8}$	27	.589	$\frac{19}{32}$	$\frac{3}{8}$	4	2.131	$\frac{21}{8}$
$\frac{3}{8}$	32	.157	22	$\frac{3}{8}$	*18	.571	$\frac{37}{64}$	$\frac{1}{2}$	4	2.256	$\frac{21}{4}$
$\frac{3}{8}$	30	.155	23	$\frac{3}{8}$	12	.544	$\frac{35}{64}$	$\frac{1}{2}$	4	2.381	$\frac{23}{8}$
$\frac{3}{8}$	24	.147	26	$\frac{1}{2}$	11	.536	$\frac{17}{32}$	$\frac{1}{4}$	4	2.506	$\frac{21}{2}$
$\frac{13}{64}$	32	.173	17	$\frac{11}{16}$	*16	.627	$\frac{6}{8}$	$\frac{1}{2}$	3 1/2	2.597	$\frac{219}{32}$
$\frac{13}{64}$	30	.171	$\frac{11}{64}$	$\frac{11}{16}$	11	.599	$\frac{19}{32}$	$\frac{1}{2}$	3 1/2	2.722	$\frac{225}{32}$
$\frac{13}{64}$	24	.163	20	$\frac{3}{4}$	27	.714	$\frac{23}{32}$	$\frac{1}{2}$	3 1/2	2.847	$\frac{227}{32}$
$\frac{7}{32}$	32	.188	12	$\frac{3}{4}$	*16	.689	$\frac{11}{16}$	$\frac{1}{4}$	3 1/2	2.972	$\frac{231}{32}$
$\frac{7}{32}$	28	.184	13	$\frac{3}{4}$	12	.669	$\frac{43}{64}$	$\frac{1}{8}$	3 1/4	3.075	$\frac{31}{16}$
$\frac{7}{32}$	24	.178	16	$\frac{3}{4}$	10	.653	$\frac{21}{32}$	$\frac{1}{4}$	3 1/4	3.200	$\frac{35}{16}$
$\frac{15}{64}$	32	.204	6	$\frac{15}{16}$	12	.731	$\frac{47}{64}$	$\frac{3}{8}$	3 1/4	3.325	$\frac{35}{16}$
$\frac{15}{64}$	28	.200	8	$\frac{15}{16}$	10	.715	$\frac{23}{32}$	$\frac{1}{4}$	3	3.425	$\frac{37}{16}$
$\frac{15}{64}$	24	.194	10	$\frac{1}{8}$	27	.839	$\frac{27}{32}$	$\frac{1}{8}$	3	3.550	$\frac{39}{16}$
				$\frac{1}{8}$	*18	.821	$\frac{53}{64}$	$\frac{1}{4}$	3	3.675	$\frac{311}{64}$

*S. A. E. Standard

†U. S. Standard

The Metric System of Measurement

Measures of Length

1 Millimeter (mm.) =	0.03937079 inch, or about 1/25 inch
10 Millimeters = 1 Centimeter (cm.) =	0.3937079 "
10 Centimeters = 1 Decimeter (dm.) =	3.937079 "
10 Decimeters = 1 meter (m.) =	39.37079 inches, 3.2808992 feet, or 1.09361 yards
10 Meters = 1 Decameter (Dm.) =	32.808992 feet
10 Decameters = 1 Hectometer (Hm.) =	19.927817 rods
10 Hectometers = 1 Kilometer (Km.) =	1093.61 yards, or 0.6213824 mile
10 Kilometers = 1 Myriameter (Mm.) =	6.213824 miles
1 inch = 2.54 cm., 1 foot = 0.3048 m., 1 yard = 0.9144 m., 1 rod = 0.5029 Dm., 1 mile = 1.6093 Km.	

Measures of Weight

1 Gramme (g.) =	15.4324874 gr. Troy, or 0.03215 oz. Troy, or 0.03527398 oz. avoird.
10 Grammes = 1 Decagramme (Dg.) =	0.3527398 " "
10 Decagrammes = 1 Hectogramme (Hg.) =	3.527398 " "
10 Hectogrammes = 1 Kilogramme (Kg.) =	2.20462125 lbs.
1000 Kilogrammes = 1 Tonne (T.) =	2204.62125 lbs., or 1.1023 tons of 2000 lbs., or 0.9842 ton of 2240 lbs., or 19.68 cwt.
1 grain = 0.0648 g., 1 oz. avoird. = 28.35 g., 1 lb. = 0.4536 Kg., 1 ton 2000 lbs. = 0.9072 T., 1 ton 2240 lbs. = 1.016 T., or 1016 Kg.	

Measures of Capacity

1 Liter (l.) = 1 cubic decimeter =	61.0270515 cubic in., or 0.03531 cu. ft., or 1.0567 liquid qts., or 0.908 dry qt., or 0.26417 Amer. gal.
10 Liters = 1 Decaliter (Dl.) =	2.6417 gal., or 1.135 pk.
10 Decaliters = 1 Hectoliter (Hl.) =	2.8375 bu.
10 Hectoliters = 1 Kiloliter (Kl.) =	61.0270515 cu. in., or 28.375 bu.
1 cu. foot = 28.317 l., 1 gallon, Amer. = 3.785 l., 1 gallon Brit. = 4.543 l.	

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WRIGHT

ASPIRIN



Parcel Post Insurance



FOR UNITED STATES AND CANADA

We insure all parcels valued at not less than 50 cents or more than \$500 and add the required fee for insurance to amount of invoice.

<i>Fees</i>	<i>Indemnity</i>
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Five cents	value up to \$25.
Eight cents	value up to \$35.
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Thirteen cents.	value up to \$60.
Fifteen cents	value up to \$75.
Eighteen cents	value up to \$85.
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